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ON THE ROOT OF SCARCITY.

To the Trustees of the Massachusetts Agricultural Society.

IT is well known to all of us, that the *root of scarcity*, as it has been often called, has, in most countries of Europe, been very celebrated for its great products, and its valuable properties as food, both for men and domestic animals. Its cultivation, however, especially in this country, has been in no degree proportionate to the favourable accounts which have been given of it. I have thought that, at a moment when the extended propagation of sheep appears to threaten the diminution of the number of other valuable domestic animals in consequence of the scarcity of food, it would be useful to turn our attention to such plants as may have a tendency to prevent this scarcity. It is the more important in our country since the severity of our winters precludes us from using the turnip as green fodder for our sheep during the winter months.

The best account I have seen of the root of scarcity may be found in the Abbé Rosier's *Cours complet d'Agriculture*, from which the following translation has been made. I do not vouch for the accuracy of the statements, but the public may rest assured that it is the most approved work on agriculture now in use in France. The plant has been cultivated successfully here, and thrives with us as well as in France.

J. LOWELL, *Corresponding Sec'ry.*

Dec. 3, 1814.

Abbreviated translation of the Abbé Rosier's remarks on the "Racine de disette," [root of scarcity] *or Bête rave champêtre,* [field beet.] *It is the Beta albissima of Linnæus.*

The field beet, somewhat harder and less sweet than the common garden beet, grows like that chiefly above ground, into which it does not penetrate more than half its whole length. It would be apt to rot if you should cover it with soil.

It has one extremely valuable property, and that is, that you may strip it repeatedly of its leaves and thus furnish a most abundant forage for cattle, and it will rather thrive upon it, while the common beet is much injured by such treatment.

Its culture is easy—its advantages numerous. It will supply the place of all other food for cattle. It succeeds in all soils, and especially in those which are humid or light.

This root is very little affected by changes of weather. It is attacked by no insect—drought affects but little its vegetation. It prepares the ground extremely well for other crops. It is known in Germany by the name of mangel-wurzel. Rosier recommends that the root of scarcity should be sown in beds, and then transplanted, but this expense is not necessary. It may be sown and treated precisely like the common beet, except that they ought to stand eighteen inches asunder those that are left to grow.

The more the land is manured and cultivated, the better the plants. In ordinary land, with common culture, they will only weigh five or six pounds a piece, and the leaves can only be stripped four or five times in a season. In good land they often weigh nine or ten pounds, and are stripped eight or nine times. In a light, sandy, but well manured soil, they sometimes weigh fourteen and even sixteen pounds each!

The first crop of leaves in France is taken off in the latter end of June, or the beginning of July. In this country, probably, the latter period would be preferable. The lower leaves, those which incline towards the ground, are those which are taken away, and care must be taken to preserve the top leaves or the crown of the plant. The leaves may be taken off every fifteen days after the first gathering. Oxen, cows, and sheep devour them greedily, and fatten readily upon them. All do-

mestic poultry eat them readily when chopped fine and mixed with grain. Horses will feed upon them very well, mixed with chopped straw. Hogs also fatten upon them.

REMARKS.

Cows fed upon them solely, give a greater quantity of milk and cream, and of better quality for the first fifteen days, after which they grow too fat and the milk lessens. The food of cows must, therefore, be varied. Oxen and sheep fatten very well upon them. Cows should have grass in the proportion of one third to the beet leaves, or every third day they should be turned to grass. In this mode their milk will be excellent. The trouble of gathering the leaves is less than that of gathering any other green fodder. It may be done by children, while men are required to cut other green food for cattle. It is the surest crop since the plant will stand the largest droughts. He adds, that the leaves make an excellent vegetable for the food of men, but as in our country we have such an abundance of green vegetables, this may be deemed of small consideration.

The roots are gathered and treated like those of the common beet. The skin is very tender and care should be taken to handle them so as they may not be wounded, as they will, in that case, not keep so well.

In order to preserve the seed in purity, care must be taken to change the ground in which the seed-beets are planted.

The seed can be preserved after it is gathered three or four years without injury.

In giving these roots to cattle for food, they are first washed and then cut up into pieces about the size of a nut.

It is always best to accompany them when given to horned cattle with clover, or other hay or straw, and if the hay or straw has been previously cut fine, it will be preferable.

If horses are fed with this root, with a proportion of hay or cut straw, (half of each,) they will be fat, vigorous, and healthy. If they are worked severely, a little oats or corn may be added. It is thus they are treated in Germany, where this root stands in the stead of meadows or grass lands, and whose excellent horses are well known.

Hogs fed upon them raw, after they have been cut up fine and mixed with milk or other drink, fatten as well upon them as upon boiled potatoes, by which the fuel and trouble of boiling is saved.

As to the quantity given to animals, much will depend on the proportion of other fodder which you allow them. Cows fed twice a day upon eighteen pounds of these roots at each time together, with four pounds of hay or chopped straw, will give as much and as good milk as in summer, and they will be kept in the best possible state.

Oxen fed with forty weight of these roots per day, with ten pounds of hay for one month, and after that with fifty weight per day of the roots alone, will be fat enough for sale in two months more.

Any person disposed may, from the facts above stated, calculate how many cattle will be supported by a single acre on which this plant is cultivated. Its benefits are indisputable.

The Abbé concludes with this summary:

1st. Men can eat this vegetable throughout the year. It is agreeable and healthy.

2d. No insect whatever attacks it. It suffers little from the variety of seasons.

3d. The leaves of this plant form alone an excellent food for every species of domestic quadruped during four months in the year. Turnips and other vegetables are besides liable to be destroyed by insects, whereas this beet is not.

4th. The roots can be preserved eight months in a sound state, while turnips are of little value after March.

5th. In some soils turnips will not grow, particularly in those that are very stiff or strong. The root of scarcity grows every where.

6th. The milk of cows fed on turnips has a bad taste. That of those fed on this plant is excellent as is also the butter made from it.

This forage or green fodder comes also at the hot seasons, when almost all the green food is scarce and sometimes not to be procured. Cattle never get tired of it. In many parts of Germany where it is raised with success, they prefer it to every thing else to fatten those large herds of cattle which they annually export to France.

ON CUTTING CARROT LEAVES AS A GREEN FODDER.

[We introduce the following extract from the Repertory of Arts and Manufactures, not so much because we place confidence in the suggestions of the author, as that we think they are most fully proved to be unfounded by the very satisfactory experiment of the Hon. Mr Quincy which follows.

It will be observed that the English writer does not speak of his own experiments, but of those of a friend, nor is there that accuracy in comparison and detail which would be requisite to establish a fact so contrary to all analogy and experience.

We introduce the British opinion because one similar to it appears to prevail in this country. In our last number we published a suggestion of the same nature, and requested gentlemen of leisure who were in the practice of cultivating the carrot to make the experiment carefully. This has now been done by our colleague, Mr. Quincy, and one can scarcely conceive any thing more perfect. We shall consider the question therefore as settled, that carrots follow the laws of other vegetables whose growth depends nearly as much upon the leaves as upon the root.

It ought to be observed in favor of the English writer, that the plant was not deprived of its leaves till some of them had begun to decay, nor until the root had probably attained nearly its size. We cannot believe however even in the case stated the result would have been in favor of the mown carrots.

There is a difference it must be admitted in the œconomy of different plants. While some will instantly perish if deprived of their leaves, others appear to suffer but little comparatively. Hence where the value of the leaf is either the principal cause of its cultivation, or bears a very considerable proportion to that of the root, it is often expedient to pluck it. This is the case with the woad and some other plants. Hence too it may be politic to strip the Mangel Wurzel or root of scarcity (of which we have inserted some account in the present number) because it appears that its leaves are renewed with great rapidity and furnish repeated crops of very valuable fodder. The leaves of the carrot, on the other hand, are of slow growth and

do not attain the size which they had when cut in July till late in September. We have been more full in this note because the subject is interesting, because opinions in opposition to the result of Mr. Quincy's experiment appear to have been entertained in Europe and America, and because it might appear in some degree contradictory that we should insert an article in this same number recommending a similar treatment of the root of scarcity to that which we censure in the cultivation of the carrot.

We are not answerable for the accuracy of the Abbé Rosier, and are not convinced that the root of scarcity would not be more profitable if not stripped of its leaves, though we can see reasons why that plant should not suffer so much by such a privation as the carrot and potatoe.]

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METHOD OF MAKING HAY FROM THE LEAVES OF CARROTS, AND IMPROVING THE SIZE OF THE ROOTS.

BY RICHARD WESTON, *of Leicester, England.*

[From the Repertory of Arts and Manufactures.]

EVERY quadruped which feeds on carrots improves and soon gets fat; also geese, ducks, fowls and turkies as I have proved by my own experience. The leaves are known to partake of the same nutritious quality as the roots, but the value of them is lost by our not knowing a use to which they may be applied with advantage, that is making them into hay.

About the end of July or beginning of August, when the leaves appear to be fully grown and the lower ones begin to wither, mow them, but do not let the scythe cut the crowns of the roots from which the leaves are produced, as this will prevent their shooting out again. As soon as the leaves are mown they must be carried off the ground, spread about thinly and made into hay in the usual manner. At first they must be frequently turned to prevent them from moulding.

The ground being cleared, you have an opportunity of seeing where the carrots grow too thick. Thin them to a proper distance of eight or ten inches asunder, as you would wish them to be either small or very large, and let the land be well hoed;

receiving a check from the leaves being cut off, they will soon put forth fresh ones. But the consequence must be, that their roots will increase in size. To prove the utility of hoeing, leave a part not hoed and a small part not mowed to convince you of the propriety of the method above stated. I have seen this method practised by Mr. Baker, of Bristol House, near Leicester, and attended with great advantage. The produce was very great compared with his crops of grass hay. The field of carrots was between three and four acres.

Quincy, 27th October, 1814.

SIR,

The Massachusetts Society for Promoting Agriculture having expressed a wish,* that the fact might be ascertained, whether, as had been asserted, the top of the carrot might be cut, as a green fodder, without injury to the growth and productiveness of the root, I was induced to make an experiment upon a scale, calculated, as I hoped to put the question at rest.

I caused twenty-six beds of carrots to be laid out, side by side—an alley of one foot width between each—in length of beds, in number and width of rows, in quality of soil and equality of cultivation, in every respect, as far as possible, they were similar. In the month of July, when the lower leaves first began to wither, I caused every other bed to be cut, as directed, being careful not to crop the crown or head of the root. So that there was *a cut and an uncut bed* alternately through the whole piece. About the 20th instant, I caused these beds to be dug and each measured separately and its product compared with the product of the adjoining bed. The result was singularly uniform, and for the difference no cause is perceptible, except that produced by the operation of cutting the tops.

Their respective products were as follows:

Product of uncut bed.		*Product of cut bed.*	
No. 1	8 bushels.	No. 1	5 bushels.
2	7¼ do	2	5 do
3	7½ do	3	4½ do
4	9 do	4	5½ do

* See p. 46, and p. 99 of this volume.

No. 5	9 bushels.	No. 5	5 bushels.
6	10 do	6	5½ do
7	9 do	7	4 do
8	7¼ do	8	4¼ do
9	7 do	9	3 do
10	7 do	10	4¼ do
11	7½ do	11	4 do
12	8 do	12	4 do
13	8¼ do	13	4¼ do
	Bushels 104¼, total product of the uncut beds.		Bushels 58, total product of the cut beds.

The above must be understood to be the product of the roots. The tops having been cut off before measurement.

Judging by the eye, the size of the roots of the *cut beds* was nearly two thirds less than that of the *uncut beds*. In order to estimate this point more accurately I caused one bushel of the roots taken indiscriminately from one of the *uncut beds*, to be counted, and also one bushel of the roots taken indiscriminately from one of the *cut beds*. The former contained *two hundred and seventy-one* carrots. The latter *six hundred and forty-four*. On weighing the bushel of carrots taken from the *uncut bed*, I found it weighed *fifty-three pounds*. That from the *cut bed* weighed *forty-eight pounds*.

On weighing the tops cut from each of the above bushels respectively, the weight of the tops of the bushel from the uncut bed was *fifteen pounds*, that of the cut bed was *nineteen pounds*.

From all which I think it sufficiently apparent that the doubts of the Society, expressed in the forty-seventh page of the present volume were well founded, and that the carrot forms no exception to the usual analogy observed by nature in the growth of vegetables.

I am Sir, very respectfully,

Yours, &c.

JOSIAH QUINCY.

To the Corresponding Secretary.

STATEMENT RESPECTING MERINO SHEEP.

Jamaica Plains, 13th June, 1814.

SIR,

IN September, 1810, I purchased five full blooded ewes and a ram, of the *Paular flock*, which were just landed from Spain, and in good order; and supposing it would be gratifying to the Agricultural Society to know the *progressive improvement* in their fleeces, and particularly so in those of their progeny, I give you the following statement, having myself particularly attended to the several shearings:

Of 1811, I have lost the memorandum.

.. 1812, the five fleeces of the ewes weighed - lb. 25 4 oz.

.. 1813, of same five sheep 29 12

.. 1814 do do 32 3 oz.

The average of these last - - is 6 7 oz.

Of 10 fleeces from lambs or sheep raised from them, of the 2d and 3d shearing 7 4

.. 9 fleeces from lambs raised from the imported merinos, first shearing 8 11

Making the average of the flock seven pounds ten ounces in the yolk or grease. In consequence of the many rains before shearing, my wool was never so clean or free from dirt at any previous shearing. They are never yarded or housed, but at night—this they are the year round for fear of dogs.

I do not observe the least falling off in the quality of their wool. My little flock now consists of twenty six ewes, and I have on hand twelve rams, and eight have been sold; all of them were produced from the five first purchased, and several are again near yeaning. I have never lost a full-blooded sheep or lamb since I commenced keeping them.

I am, &c. &c.

JOHN PRINCE, Jr.

To the Corresponding Secretary.

N. B. Having kept some *common* sheep at the same time, I am satisfied the merinoes eat less, and keep in better order on the same food, and are, to say the least, as hardy.

ON THE CULTURE OF RHUBARB.

[The following article from a very intelligent correspondent, on the cultivation of rhubarb, is certainly deserving of attention, because the real rhubarb is a hardy plant which will flourish extremely well in our climate, and there is no reason why we should import it at great expense from foreign countries. But we are persuaded from the history which he gives of the plant now cultivated in the county of Hampshire, that it is not the true rhubarb employed in medicine. The plant sent by Mr. Vaughan to Judge Strong, we are persuaded is the *rheum undulatum*, a plant which the former gentleman introduced, and has sent to many of his friends. Its leaf-stalks are used as a preserve for tarts, and are equal or superior to the gooseberry for this purpose.

The true rhubarb is the *rheum palmatum.* This plant is also in some of our gardens, and may be propagated with as much ease as the other.

All the species of *rheum* have roots which resemble each other in their texture, size, and in some degree in their medicinal qualities, as it is said, but the rheum palmatum is much the most powerful. We are satisfied that our respectable friend, whose object is the promotion of the best interests of his country, will excuse us for explaining this subject. We are satisfied we are right, as we are well acquainted with both plants, and have often seen them.

We think it highly improbable, that the plant sent to Judge Strong was the true rhubarb of the shops, since we know that the one which was distributed by Mr. Vaughan was not so. That gentleman, we are satisfied, never supposed it to be the rhubarb of medicine. This notice we insert, because it may induce some persons to undertake the cultivation of the *rheum palmatum.*]

COMMUNICATION FROM JUSTIN ELY, ESQUIRE, RECOMMENDING THE CULTURE OF RHUBARB.

West-Springfield, August 20, 1814.

Doctor Aaron Dexter,

DEAR SIR,

THE United States are annually at considerable expense for the article of rhubarb. Perhaps no country in the world can more easily and successfully raise rhubarb for consumption and for exportation than New-England, and perhaps every part of the United States. Small pieces of the roots put into ground in the spring, will commonly grow as well as a piece of dock root. It has been successfully raised in this neighbourhood for several years past. I intend to send you some for trial in October or November next; some physicians have tried it, and judged it as good as the best imported.

In the fourth volume of the American edition of Willich's Domestic Encyclopœdia, from page 381 to page 385, is a particular account of the encouragement given by the Society of Arts in England for raising it, and of the method of raising and curing it, which I wish you to read, and I think it would be giving beneficial information to the community to publish that account in one of your Numbers. The seed are apt to blast in this part of the country, but from thirty to forty slips or off sets for setting out may be had from one large root that is taken up. Slips of the length and bigness of one's little finger, cut from the crown of the root downwards, answer well to set out. There is some variety in the rhubarb propagated in various parts of the country. The rhubarb we have, was sent by Mr. Vaughan of the District of Maine, to the late Judge Strong of Amherst, and is supposed to be genuine.

I am, &c.

JUSTIN ELY.

ON THE CULTURE OF BURNET.

It is much to be regretted, that the enthusiasm which is apt to be excited in favour of new discoveries should be extended to agricultural experiments. Yet, perhaps, no art has suffered more than this most important one, by the extravagance of those who fancy that they have discovered some new improvement in it. Instead of deliberate and cautious experiments, we are often led astray by rash and zealous men, who, finding a new plant or a new machine for the abridgement of labour, are wont to represent its advantages in language rather suited to works of fancy, than to those of sober experiment.

Hence it has often happened, that a new discovery in agriculture having been improperly and extravagantly praised, and having, upon experiment, been found to fall far short of what had been promised, has been precipitately abandoned.

We could enumerate some hundred instances of this nature. The article of *burnet* furnishes us with a striking example, and we are induced to select it at this time, because a very respectable Society of agriculturalists at Chelmsford have sent to this Society a request for their opinion as to the culture of this plant, and one of our associates has also selected an article on this subject, which we shall subjoin with the following preliminary remarks.

It is the duty of an Agricultural Society, to encourage the culture of any plants which afford a reasonable prospect of improvement, but it is equally their duty to state all the doubts and difficulties which have been suggested to such cultivation in other countries.

About twenty or thirty years since burnet had a very considerable reputation in Great-Britain, and was spoken of as a most admirable fodder, particularly for sheep. It is not, however, to be denied that its culture has not generally succeeded in Great-Britain.

The late excellent Dr. Dean, in his georgical essays, appears to have caught the enthusiasm which at that time prevailed in Great-Britain.

In addition to the important fact, that its culture has not been favoured in England since the period when it was so highly recommended, we ought to say, that the celebrated Miller, the ablest gardener and cultivator of that kingdom, and Dr. James Anderson, much distingnished for his writings on agriculture, both condemn it.

But if it had succeeded in Great-Britain, there are reasons why its culture would not be profitable in our country. It is a plant which is much disposed to preserve its growth in England, in the winter months. It is recommended chiefly on that account as a winter food for sheep.

But our climate is so much more severe, that we can scarcely hope that a plant perfectly vivacious through a British winter will succeed in our country; and it is a well known fact, that the plants which retain their verdure in that country through the winter, do not stand our winters as well as other plants which lose their foliage earlier.

Plants that are evergreens, with them are more apt to perish in our climate than those which are deciduous.

The burnet has been tried, and pretty fairly, in our country, (we mean in New-England,) and it has been very generally destroyed by our severe frosts.

These remarks as guardians in some measure of the agricultural interests, we thought it our duty to make before we introduced the following articles. Yet we earnestly solicit the wealthy experimental farmers to try this plant, and to enable us to give to the public satisfactory information respecting it. As we have often observed in the course of this work, any plant which will furnish a cheap food for our sheep will be a great blessing to our country.

From Dickson's Agriculture, vol. 2, page 837.

Burnet is a plant that may be cultivated for cattle, but its principal use is for sheep pasturage, it succeeds on most sorts of soils, as those of the sandy, clayey and peaty kinds, it is asserted to form a large proportion of the natural pasturage of extensive tracts on

the most fertile parts of the South Downs. Its most beneficial application is in the way of an early green feed for sheep or other stock. It should always be made use of in its young and tender state of growth, as being better relished. In soils that are fertile and suited to its cultivation it is said, under proper management, to afford good pasturage in the latter end of January and through the whole of the two following months. The severe weather in winter affects it less than most other herbaceous plants, being so hardy as in some cases to vegetate in that season, when the weather is a little open. If not fed down, it may be cut at the above period as a green food. Its property of resisting the effects of drought in the summer season, is likewise a circumstance of much importance in its favour: it has also the quality of getting thicker and more close on the land by time. For the purpose of hay it is a plant that is said to afford a large produce, but requires to be cut rather early, to prevent its coarseness.

Page 1150.—Another crop for feeding sheep in the spring which is of particular merit is Burnet, an acre of it properly managed will at this season yield much more food than an acre of clover and ray grass. It should be four or five inches high in November and left so through the winter. Burnet has the singular quality of maintaining its green leaves through the winter, so that under deep snows, you find some luxuriance of vegetation—from November to February the crop will gain two or three inches in growth in young leaves, and then be ready for sheep—it will be better in March, and (if kept,) fit in April, not only for sheep, but horses, cows or any other stock.

Burnet.—*From Willich's Domestic Encyclopædia.*

Mr. Miller asserts in his Dictionary, that the burnet is left uneaten by cattle, when the grass around has been cropt to the roots; that in wet winters and in strong lands, the plants are of short duration; and that the produce is insufficient to tempt any person of skill, to engage in its culture.

Dr. Anderson in his Essays on Agriculture affirms, that the produce of Burnet is too small to be worth cultivating.

On the other hand we meet with several authorities by whom the upland Burnet is strongly recommended as proper food for

cattle, on account of its partaking of the nature of evergreens, and growing almost as quickly in winter as in summer.

For the first introduction of this plant, into arable fields, we are indebted to Bartholomew Rocque, a farmer of Walham Green, near London; who in March, 1761, sowed six pounds of the seed upon half an acre of ground, with a quarter of a peck of spring wheat; but the seed being very bad it came up but sparingly. Not discouraged by this failure, he sowed two other pounds in the beginning of June upon about six roods of ground which he mowed in the beginning of August, and at Michaelmas transplanted them on about twenty roods of ground, at the distance of one foot each way, taking care not to bury the heart. These crops bore two crops of seed in the following year; the first about the middle of June, and the second about the middle of September. In the second year also two crops of seed were produced. As it could not be cut after September, he let it stand till the next year, when it sheltered itself and grew very well through the winter, except during a hard frost, when it nevertheless remained green. In March it covered the ground and was fit to receive cattle. It may be mown three times in one summer just before it begins to flower. From six roods of ground he obtained 1150 pounds at the first cutting of the third year; and was enabled to sell, in autumn 1763, no less than three hundred bushels of the seed.

The next authority is that of the Rev. Davies Lambe, Rector of Ridley in Kent. He is persuaded that burnet will prove a great acquisition to husbandry as a winter pasture; because, as he says, it never blows or hoves *cattle* and will flourish upon poor, light sandy, stoney or chalky land. After the first year it will weed itself, and be kept clear at little or no expense.

Mr. W. Pitt, a respectable farmer of Pendeford, Staffordshire, when speaking of the culture of the upland Burnet, informs us that one of his neighbours has observed in it this valuable property as a meadow grass, that it preserves the hay from over heating in the stack; and that the hay of a meadow in his possession, which contains naturally a considerable portion of this grass, always comes from the stack of a fine, fresh, green colour, while his other hay, without this plant, was over heated and turned out quite brown.

Mr. Rocque's directions for the culture of Burnet are concisely as follows. 1. Although it flourishes on stoney and gravelly, as well as in strong lands free from water, yet it will succeed better on a dry soil, nor will it thrive on grounds newly broken up. 2. It may be sown in any of the summer months, and will appear above ground in eight or nine days. 3. The soil should be worked very fine with a harrow, and rolled; twelve pounds of seed are sown to an acre, when it should be slightly harrowed and rolled again. 4. The first year it must be kept very clean; and in the next it will become strong enough to choak all other grasses, for no drought stints it, and no frost destroys it. 5. If two horses are allowed to an acre, it will grow faster than they can eat it: the first crop purges them as effectually as the strongest physic; which is, however, the case only for three days. It is said to cure horses of the distemper called the *grease*, and sheep of the *rot*.

COMPARATIVE ADVANTAGE OF SOWING BROADCAST AND BY DRILL.

Dorchester, September 2, 1814.

SIR,

THE Massachusetts Agricultural Society having requested communications of experiments in agriculture, I take the liberty to transmit you the result of one I made this season in the culture of barley.

On the 18th April last, I took a piece of ground one hundred and thirty-four feet long, and fifty-six feet wide, one half of which I sowed with barley in the usual way of scattering the seed, and used six quarts, one pint and a half at the rate of two bushels and a half to the acre. The other half I laid out in drills six inches asunder, and instead of sowing the seed, I planted it; (each grain four inches apart,) and raked the ground over, so as to cover the seed about one half of an inch. I used three pints of seed which I had previously steeped thirty-six hours in brine, made with salt-petre, in the proportion of one ounce to two quarts of water. This I planted on the 23d of April,

five days after sowing the other; it came up in five days. The barley *sowed* did not make its appearance until the eighth day. There was soon a very visible difference; the barley *planted* being of a much deeper green colour, and the blades much ranker. On the first of August I mowed both pieces, and put the whole into the barn the same afternoon, taking particular care to keep the two parcels separate. There was about one third more straw of the barley planted, than of that sowed, and after thrashing and winnowing it carefully, there was a difference of seventeen quarts in the quantity of barley. That planted in rows produced three bushels and one quart. That sowed in the usual way, two bushels and a half. I weighed a bushel of each, and found a difference of eight and an half pounds. The barley planted in rows weighed fifty-five and an half pounds, and that sowed forty-seven pounds.

It appears from the result of this experiment, that less than half a bushel of seed planted in rows is sufficient for one acre of ground, and that it will produce nearly a quarter part more barley, than two bushels and a half sowed in the usual way of scattering the seed. By planting in rows six inches asunder, and the seed four inches apart in the rows, each grain will have a portion of earth to nourish it equal to twenty-four square inches superficial, and in depth, the whole staple of the land to that extent, or in proportion to the depth of the tillage; but in the present mode of sowing grain, the ground is but partially covered, there being frequently spaces of a foot square without any seed, and then a number of grains so close together, that the roots unite, and not having room to spread, nor sufficient earth to nourish them, they never come to their full growth.

Much of the seed *sown* is destroyed by birds, for want of being properly covered; this evil will be prevented by *planting*.

I was induced, Sir, to make this experiment from reading in an English magazine, a communication from an eminent farmer in that country, wherein he sets forth the amazing advantage that would be the consequence of introducing this regular method of planting wheat, instead of the present random practice of sowing. He says, that two bushels and a half are the medium quantity of wheat sown on an acre of ground throughout England, and that two millions and a half acres is the medium quan-

tity of land annually employed in the culture of that grain, and that the saving of seed in the first instance, will be a saving of 644,500 quarters of wheat, amounting at the rate of forty shillings a quarter to £1,289,000, and yielding bread for 850,000 people, at one pound a day for each.

I am, &c.

THOMAS HEWES.

To the Recording Secretary.

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NOTE. For the purpose of comparing the produce of turnips by the drill and broadcast husbandry, two gentlemen of Sussex, England, who had cultivated them to some extent, about the middle of November, measured a square rod on each of their farms, and the turnips thereon counted and weighed. The following was found to be the result:

By the drill, the rod produced one hundred and thirty turnips, measuring nine bushels, and weighing three hundred and ninety four pounds, eleven ounces; weight of the tops ninety-three pounds, twelve ounces. By the broadcast, the rod produced one hundred and thirty-five turnips, (in number five more than by the drill,) but measuring only six and a half bushels, and weighing two hundred and eighty four pounds; weight of the tops, fifty-seven pounds, twelve ounces. So that no less than six tons, eighteen cwt. twenty ounces of turnips will be raised on an acre of land by the drill more than by the broadcast system.

[*Selected.*]

PRACTICAL REMARKS ON THE MANAGEMENT OF THE DAIRY, PARTICULARLY IN RESPECT TO THE OBTAINING OF BUTTER.

[From Anderson's Recreations in Agriculture, &c.]

MY idea respecting disquisitions on agriculture is, that nothing can be deemed perfect which can be rendered more so, and that this degree of perfection should be the object aimed at in every such disquisition. With this view, the circumstances that can

end to affect the particular department in question, so as to augment or diminish the amount of the produce, or to improve or deteriorate its quality, ought to be, as much as possible, adverted to, in order that those, who wish to improve by such disquisitions, may be directed not only how to act so as to derive the full benefit of all the knowledge that the writer himself proposes, but also that they may have their attention turned toward such unascertained circumstances, as would have a tendency still further to perfect, the practice in that department, were they known. Thus will they be able to go on with intelligence in every step of their progress, and be continually advancing, by ascertaining some facts that their experience shall enable them to discover. In taking a comprehensive survey of the business of the dairy with this view, we shall find that the subject naturally divides itself into many branches, which will best be considered in succession; the first that we shall take notice of, as being nearly connected with the subject treated in our last, is

First, The choice of cattle for the purpose of the dairy.

Here a question arises that has never yet, that I know of, undergone discussion. In consequence of the idea having so long prevailed, that all the varieties of cattle were originally derived from the same parent stock, it never was once suspected that these varieties could differ from each other in regard to great characteristical distinctions. It was, for example, generally believed, that all sheep carried wool of some kind or other, unless in as far as, (according to a vague notion that prevailed respecting the influence of climate,) it had been affected by the climate. It has now been proved that this notion is erroneous, and that in the same climate, and in the same field, may be kept sheep bearing fine wool, coarse wool, long hair, short hair, and many other diversities and different mixtures of hair and wool, for their whole life, and still retain the original characteristic differences. In like manner it was believed, that no kinds of cattle existed which carried a coat that could in any degree be compared to a fleece of wool; and it was also supposed, that the size of cattle necessarily depended on the scarcity or the abundance of their food, especially while young. These also have been proved to be equally erroneous with the former opinion. It was also in general conceived, that the greater or less delicacy of meat o

the same denomination, such as beef or mutton, depended chiefly on the kind of feeding which the animal had had, sometimes in connexion with the age of the creature; but it was not suspected, that a great diversity in this particular might arise from the nature of the breed. In like manner it was known that some cattle gave more or less milk, and of a quality in proportion to their size richer or poorer; but it does not as yet seem to be imagined, that different breeds may yield milk which possesses qualities extremely different from each other, though I see very great reason to believe that this may actually be the case; and that, therefore, it behoves us to be on our guard, and carefully to attend to this particular. We know that the milk of those breeds of sheep, usually reared in this country, differs very much from that of our common cows for many economical purposes. Ewes milk, for example, though fully as thick as that from cows, yields very little cream, and that cream gives butter of a quality greatly inferior to what is obtained from the milk of cows. But on the other hand, the same measure of ewes milk will give more than double the quantity of curd that our cows' milk affords. Goats' milk, if my information be right, give still less cream, and scarcely any butter, but a very large proportion of cheese and little whey. Hence, for the purpose of the dairy, ewes milk can be much more profitably applied to making cheese than butter; and the same may be said of goats' milk. Hence also it happens, that cheese is the principal produce of the dairy in Switzerland and other mountainous countries best adapted for the pasturage of goats; while in the Netherlands, Holland, and similar rich flat countries, butter is the staple article obtained from the milk,

I state this merely to show, that the qualities of milk may vary greatly for certain economical purposes, when that variation is not obviously indicated by its external appearance. It therefore behoves us to keep this circumstance continually in our eye in all our researches concerniug the choice of cattle for the purposes of the dairy; as it is by no means certain that some breeds may not give milk, that may much more nearly approach the nature of that of ewes or goats than others. To shew the benefit that may sometimes be derived from this kind of attention, I shall beg leave to state an accidental experiment which

brought a circumstance of this kind to light, where it was not in the smallest degree suspected. A friend of mine, who kept only a single cow for the use of his own family, bought in one, (from a person who kept from fifteen to twenty cows, chiefly for the purpose of rearing calves, but in a subsidiary view for the dairy,) which was recommended as an excellent cow, that gave a large quantity of milk for her size, and that of a most excellent quality. This last was a circumstance of great consequence to my friend, who took care to taste the milk, and found it excellent, I believe, before the bargain was finally completed. But, although that milk was thick and rich to the taste, it could never be made to yield one bit of butter, though they tried every method that could be devised for that purpose; on which account he was obliged very soon to part with the cow. Now, it chanced that this cow had given milk for three seasons before she was sold, without its having been ever discovered or suspected that her milk did not give as much butter as that of any cow in the dairy:

This experiment proves, that there may be individual cows among a great number which yield milk that possesses qualities extremely different from those in general of that breed, although to the eye and taste it appears not to differ from them at all; and therefore it behoves every person who wishes to conduct this business with a proper degree of attention and economy, always to ascertain the qualities of the milk of every cow individually, as soon as she is turned into the dairy; otherwise he may, like the person to whom this cow originally belonged, be going on for years together, and never know that he is subjecting himself to a great expense daily, without drawing any return for it. Innumerable other benefits will be found to result from the practice of keeping each cow's milk separate as much as possible, and examining it individually very often; for not only may the milk of one cow be, upon the whole, of a much inferior quality to that of another, and yield a much poorer return, which might thus be discovered, but it may also so happen that from casual disease, or other circumstances, the milk of one cow may become tainted at a particular time with a peculiar taste or other quality which may greatly injure the whole stock if it be mixed with it, and occasion losses to the owner, which by this caution might be

avoided; besides, he will thus avoid the danger of being induced, with that hasty decisiveness so common in rural affairs, to attribute the effects that arise from this unsuspected source to other circumstances that have had no influence whatever upon it. From these considerations I should recommend it as an invariable practice in every dairy, to keep each cow's milk separate on the first day of every month, at least throughout the year, for the purpose of ascertaining the quantity and quality of the milk yielded by every one of them individually. Were this practice strictly adhered to, it would advance the practical knowledge of the dairy more in the space of one year, than can be done in the random mode of procedure, usually adopted in a century; because it would lay open to view innumerable circumstances of great importance to the welfare and prosperity of the owners that are not at present suspected, and that never can come to be generally known among this class of persons, unless something of the kind here advised shall be done. I shall have occasion to specify some of these circumstances in the sequel, that I know will be disregarded by many dairy owners, merely because they have never had an opportunity of remarking them. The case that gave occasion to this remark is a striking example; but there are many others equally unattended to, and which daily occur.

Of this nature I shall briefly beg leave to specify the following diversity, that daily occurs among different varieties of cattle without being sufficiently adverted to. Some kinds yield a very large quantity of milk soon after calving, which continues to flow for a short time in vast abundance; but this flush of milk lasts only for a short time, like a horse without bottom, who sets off at the beginning of a journey with surprising alacrity, but soon becomes jaded and tired, and must have rest or he will die. Others, like a horse of true mettle, set off with less speed, but continue to make an equal progress, as at first, for a long while; so some cows give nearly as much milk after having calved ten or twelve months, as during the first month after calving, if equally well fed.

In the second place this experiment proves that milk may be yielded by varieties of the same species of animal, which may differ as much from each other in some of their economical peculiarities, as the milk of our ewes differs from the milk of

our ordinary cows. It is well known, for example, that the small *Alderny* breed of cattle affords, beyond dispute, a milk that yields a greater proportion of butter, and that also of a richer quality, than the milk of any other breed of cows common in this country; but I do not know whether it has ever been ascertained what are the comparative qualities of that milk in the production of cheese; or the proportion of milk given by these cows in respect to their size and the quantity of food they consume when compared with others. It is, I believe, a very general opinion, that such milk as affords the richest butter will also necessarily produce the best cheese; and *vice versa*. We have already shown that this is not a necessary consequence; and therefore the fact requires to be proved before it is admitted. It has also been supposed that the milk which affords the greatest quantity of butyraceous or oily matter will necessarily afford the richest cheese; by which word *richest* I suppose is meant that which is most pleasant to the palate, and that has most the appearance of butter when put to the fire. This fact also requires to be proved, which I think will not be an easy matter; for I have seen cheeses made of milk only, which were richer and more mellow than others that were made entirely of cream. There are, doubtless, cheeses made from materials that have as little oily matter in them as the Suffolk cheeses, which have nothing of their horny hardness; other circumstances tend to produce this effect.*

I shall only further remark on this subject, that different kinds of milk may also vary from each other in respect to the qualities of the residuum that remains after the separation of the butter and the cheese. But it is sufficient barely to bring this into view, without enlarging upon it; for I am afraid of tiring the reader with these niceties, as they will, I fear, be deemed by many; leaving these then for the present, I return to some other particulars that are so plain as to be within the reach of every dairy-owner in the kingdom.

* Among the causes of the toughness and hardness of cheeses, may be mentioned the bad regulation of the pressure of them in the cheese press.

It is well known, that among every kind of cattle in the kingdom, there are found individuals that give a much greater *quantity* of milk than others of an equal size: it is also known that there are some cows which give *richer* milk than others do. These two facts are universally recognised and admitted among all who concern themselves with dairies. It is also equally well known by them and by graziers, that there are some beasts which feed more kindly than others, and fatten sooner upon the same pastures: but it is not so universally recognised as a truth, that individuals may be found which give at the same time a great quantity of milk and that of the richest quality, and fatten as easily, and are as hardy in all respects as any others. This fact, however, I have already stated and I venture to state it once more as a truth; nothing afraid that it will ever be contradicted by experience, when the business of the dairy shall come to be conducted with the neccessary degree of accuracy and precision: to which I beg leave to add that these qualities, whenever they are found, are transmissible to the descendants of the beasts which possess them, among which descendants, by a proper degree of attention these valuable qualities may not only be prevented from degeneration, but may be kept on for an indefinite length of time in a state of progressive improvemennt. If it should chance that the statements I now give should be well founded, who can pretend to say what would be the difference in the total amount of the produce of the dairy throughout Great Britain, should the time ever arrive when attention to this article shall become universal? I shall not pretend to estimate it; but I have no hesitation in saying that the dairy produce would in this event be more than double; and all this, not only without augmenting the expense of the dairy; but even, in all probability, by diminishing it.

According to the present practice a dairy farmer, who relies in general upon the common market for a supply of stock, not only does not obtain the best cows with respect either to the quantity or the quality of the milk, or the kindly feeding of the beast, but the very refuse of all these; for who that has cows to dispose of will sell the best while he has others of inferior value that are to appearance in a market equally good, if he has any occasion for such himself? Were dairy farmers to breed their own cattle, universally, the case would be quickly changed: each

of these would find himself directly profited by the improvement of his breed, and this interest would awaken his perceptive faculties in a surprising degree.

General aphorisms respecting the management of milk in the dairy, for the purpose of obtaining butter.

In the management of a dairy, the following peculiarities respecting milk ought to be particularly adverted to: some of them are no doubt, known in part to attentive dairy owners; but I have reason to believe that they have never yet been considered by any one with so much attention as their importance deserves; and by many persons have perhaps never been thought of at all. I adopt the form of aphorisms that they may be the more readily adverted to and the easier remembered.

FIRST APHORISM.

Of the milk that is drawn from any cow at one time, that part which comes off at the first is always thinner, and of a much worse quality for the purpose of making butter, than that which comes afterward; and the richness goes on continually increasing to the very last drop that can be drawn from the udder at that time.

Few persons in the country are ignorant that the milk which is taken from the cow last of all at one milking is richer than the rest of the milk; on which account a distinct name has been given to it in most parts of the country. In some places it is called *afterings*, because it is usually obtained when wanted for sick persons or other uses, by remilking the cow *after* the ordinary milking has been finished.—In other places it is called *stroakings*, because it does not come in so full a stream as in the ordinary course of milking; and it is probably known by other names in other parts of the country. This circumstance sufficiently proves, that the difference in its quality has been adverted to; but few perhaps are aware of the greatness of the disproportion between the quality of the first and the last drawn milk from the same cow at one milking. The following facts respecting this particular were ascertained by me many years ago, and have been confirmed by numberless subsequent experiments and observations.—Having taken several large tea cups exactly of the same size and shape, one of them was filled at the beginning of the milking of the cow, and the others at regular intervals till the

last, which was filled with the dregs of the stroakings. A counter weight being put in for each cup, they were individually weighed, so as to ascertain with precision that the same quantity of milk was contained in each cup. From a great number of experiments frequently repeated with many different cows, the result was in all cases thus :

The quantity of cream obtained from the first drawn cup was *in every case*, much smaller than from that which was last drawn; and those between afforded less or more as they were nearer the beginning or the end. It is unnecessary here to enter into the minute details of these intermediate proportions; but it is proper the reader should be informed, that the quantity of cream obtained from the last drawn cup, *from some cows*, exceeded that from the first in the proportion of *sixteen* to *one*. In other cows, however, and under particular circumstances, the disproportion was not quite so great; but in no case did I find it fall short of the ratio of *eight* to *one*. Probably, upon an average of a great many cows, it might be found to run at the ratio of *ten* or *twelve* to *one*.

The circumstance that chiefly occasioned a variation in regard to these proportions was the nearness or distance from the time of calving; for in all cases the milk of the same cow was thinner immediately after calving than at a greater distance from it; the disproportion between the first and last drawn was also much greater soon after calving than at a more distant period. As the flush of milk occasioned by that incident abated, it became in general thicker and more uniform in its quality, so that if within a fortnight after calving the proportion of cream from the first and last drawn cups were as *sixteen* to *one*, it is probable that at the end of six or nine months the disproportion in that cow's milk would not be more than as *ten* or *twelve* to *one*.

But these variations do not take place in the same proportion in every cow; on the contrary the milk of some cows varies more in this respect than that of others; depending on the nature of the breed and other circumstances peculiar to the individual.

But if the difference in the *quantity* of the cream obtained at the beginning and at the end of the milking be great, the variation in the point of the *quality* of that cream is still greater.

In the first drawn cup, especially when the difference in the quantity was very great, the cream upon it was only a thin tough film, thinner and perhaps whiter than the paper on which I write

in the last drawn cup, it was of a thick butyraceous consistence, and of a glowing richness of colour, that no other kind of cream is ever found to possess.

The difference in the quality of the *milk* that remained after the cream was separated, was perhaps still greater than what respects either the quantity or the quality of the cream. The milk in the first drawn cup was a thin bluish liquid, appearing as if a very large proportion of water had been blended with ordinary milk; that in the last drawn cup was of a thick consistence, yellow colour, and rich taste, more resembling cream than milk in all respects, only sweeter to the taste, and less oily upon the palate.

From this experiment it appears, that the person who by bad milking of his cows, loses a little milk, loses more than is usually suspected; for if he leaves behind only half a pint of milk that might have been obtained, he loses, in fact, as much cream as would have been yielded by about six or eight pints of milk at the beginning, and loses, besides, that portion of the cream which alone can give richness and high flavour to his butter.

SECOND APHORISM.

If milk be put into a dish and allowed to stand till it throws up cream, that portion of cream which rises first to the surface is richer in quality, and greater in quantity, than what rises in a second equal portion of time; and the cream that rises in the second interval of time is greater in quantity and richer in quality, than what rises in a third equal space of time; and that of the third than the fourth, and so on; the cream that rises decreases in quantity and declines in quality continually, as any rises to the surface.

My experiments in this case not having been made with so much accuracy as in the former, I have not been able to ascertain the difference in the proportion that takes place in equal portions of time; but they have been so often repeated as not to leave any room to doubt the fact; and it will be allowed to be a fact of no small importance in the management of the dairy. It is not certain, however, but that a greater *quantity* of cream, on the whole, may be obtained from the milk by taking it away at different times, but the process is so troublesome as not to be counterbalanced by the increased quantity obtained, if indeed any additional quantity be thus obtained, which is not as yet fully ascertained.

But where the *quality* of the butter is the principal object aimed at, it may be greatly improved by duly attending to this peculiarity.

THIRD APHORISM.

Thick milk always throws up a much smaller proportion of the cream that it actually contains than milk that is thinner, but that cream is of a richer quality; and if water be added to that thick milk, it will afford a considerably greater quantity of cream, and consequently more butter, than it would have done, if allowed to remain pure; but its quality is at the same time greatly debased.

This is a fact that every person attentive to a dairy must have remarked; but I have never heard of any experiment that could ascertain either the precise amount of the increased quantity of cream that might be thus obtained or of the ratio in the decrease of its quality, but it ascertains at least the effect of mixing water with the milk in a dairy; and the knowledge of this fact will enable attentive persons to follow that practice which they shall find will best promote their own interest.

FOURTH APHORISM.

Milk which is put into a pail or other proper vessel, and is carried in it to a considerable distance, so as to be much agitated, and in part cooled before it is put into the milk pans to settle for cream, never throws up either so much or so rich cream, as if the same milk had been put into the milk pans directly after it was milked.

In this case, it is believed, that the loss of cream will be nearly in proportion to the time that has elapsed, and the agitation it has sustained after it has been drawn from the cow.

From these fundamental facts respecting the dairy, many very important corollaries serving to direct the practice may be deduced; among which we shall only stop to take notice of the following.

First. It is evidently of much importance, that the cows should be always milked as near to the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes.

Second. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished, before any part of it is put into the milk pans, seems to be highly injudicious, not only on account of the loss which is sustained by agitation and cooling, but also and

more especially because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to enlighten his judgment respecting the profit that he may derive from each. Without this precaution, he may have the whole of his dairy produce greatly debased by the milk of one bad cow, for years together without being able to discover it, as I have had an opportunity to illustrate in another part of this work.

Third. If it be intended to make *butter* of a very *fine quality*, it will be advisable not only to reject entirely the milk of all those cows which yield cream of a bad quality, but also in every case to keep the milk that is first drawn from the cow, at each milking entirely separate from that which is got last; as it is obvious, if this be not done, the quality of the butter must be greatly debased, without much augmenting its quantity. It is also obvious that the quality of the butter will be improved in proportion to the smallness of the last drawn milk that is retained; so that those who wish to be singularly nice in this respect, will do well to retain a very small proportion only of the last drawn milk.

Although I do not mean in this essay to enter professedly on the dairy management for the purpose of making cheese, it is necessary, for the purpose here stated, and other considerations that will occur, to suggest a few hints on that head, so nearly connected with the object of our present discussion. It will be found, when it comes to be investigated, that the reasoning usually adopted on this subject is in many respects erroneons. It is, for example, very generally supposed, that the goodness of cheese depends altogether upon its *richness;* by which is meant, the proportion of oily matter, whether natural or adventitious, that it contains; nothing however is more certain than that this is not the case. If the *sapor*, the pleasant relish to the taste, be adopted as the rule for ascertaining excellence, nothing can be more certain, than that this does not depend on this circumstance. *Parmesan* cheese is in general deemed in respect to *sapor* among the best kinds of cheese that are made; but contains no remarkable proportion of oily matter. To many palates, the small round Dutch cheeses are very pleasing to the taste, yet these are made entirely of skimmed milk.

If softness to the feel, and that kind of consistency which appears mellow and butyraceous, be the rule for ascertaining the *richness* of cheese, neither will this be found to depend necessarily

upon the proportion of oily matter they contain. I have seen cheeses made of skimmed milk, that ate exactly like the finest kind of cream cheese, which approaches to the taste and consistency of butter; and I have seen cheeses made entirely of cream, which had much less of that buttery taste and appearance than the other. In short, much more depends upon the skill and dexterity of the operator, than on the quality of the materials. Many cheeses are made in England of as rich milk as the Stilton cheeses, which seem not to contain nearly the same proportion of cream; and I had lately occasion to notice that a great many cheeses are made of the same kind of milk with the Suffolk cheeses, which have nothing of that horny hardness and indigestible quality for which these are remarkable.

From these facts, and many other considerations, I am satisfied that what we call the richness of cheese depends more upon the particular process adopted in the management, than upon the materials of which the cheeses consist. The taste of Gloucester and that of Cheshire cheeses are very different from each other, though the quality of the milk of which they are made varies very little. The same thing may be said of Stilton and Parmesan cheeses, though the vanity of man, desirous to conceal his own weakness, is forever disposed to attribute these peculiarities to soil or pasture, or other circumstances that seem to throw the blame from off his own shoulders. It is even so with regard to butter also, the excellence of which in every district where fine butter is made, is universally attributed to the richness of the pastures, though it is a fact well known, that take a skilful dairy maid from that district into another where no good butter is usually made, and where, of course the pastures are deemed very unfavourable, she will make butter as good as she used to do; and bring one from this last district to the other, and she will find that she cannot make better butter there than she did before, unless she take lessons from the servants or others whom she finds there. I have frequently known instances of this kind. The same takes place in the manufacture of beer. From the very same malt put into the hands of a dozen of brewers in different districts, you shall have as many kinds of beer, totally distinct from each other; and, perhaps, no verbal instructions could enable one of these persons at first to make, of that malt beer of a similar sort to that of the other. In matters of this

sort a very great diversity is produced by circumstances apparently of the most trivial kind.

Respecting the management of milk for the obtaining of cheese, I beg leave further to suggest the following particular as a proper object of inquiry and experiment, viz. whether the quantity of caseous matter afforded by milk be necessarily connected with the proportion of cream which that milk contains, or whether it depends upon some other principle not hitherto investigated? Without pretending to decide on this question, I feel myself strongly inclined to believe, that it does not depend upon the quantity of cream. It is well known that cows' milk, which always throws up more cream, and that of a much richer quality than ewes' milk, and still more so than goats' milk, does in no case afford half the proportion of cheese that either ewes' milk or goats' milk affords. Nor can this singular tendency of ewes' milk to yield a greater proportion of curd be attributed to its superior thickness; for the milk of particular cows may sometimes be had, that is richer and thicker than ewes' milk, but it always affords a much smaller proportion of curd. It is also well known that skimmed milk yields nearly, if not entirely, as much cheese as the same quantity of the same cow's milk does when the cream has not been separated from it. In short cream, or the oily portion of the milk, seems not to be convertible into curd at all; a portion of it only is entangled among the curd, while another portion of it is carried off with the scum or whey, from which it may be afterwards recovered in the form of butter, and it is well known in many countries by the name of whey-butter. That butter is, indeed, of a quality much inferior to butter obtained from cream, but this may be occasioned by the particular circumstances in the process for making cheese; and it is by no means impossible, that by attending to the process with a view to this particular, the quality of that whey-butter may be much improved. In short, it appears to me that the *caseous* and *butyraceous* parts of the milk are totally distinct from each other, and may be obtained separately, without much affecting the *quantity* of each, or even perhaps the qualities of either, were the dairy process sufficiently understood.

Fourth. If the *quality* of the butter be the principal object attended to, it will be necessary not only to separate the first from the last drawn milk, but also to take nothing but the cream that

is *first* separated from the best milk; as it is this first rising cream that is of the prime quality. The remainder of the milk which will be still sweet, may be either employed for the purpose of making sweet milk cheeses, or may be allowed to stand to throw up cream for making butter of an inferior quality, as circumstances may direct.

Fifth. From the above facts we are enabled to perceive, that butter of the very *finest* quality can only be obtained from a dairy of considerable extent, when judiciously managed; for, when only a very small proportion of each cow's milk can be set apart for throwing up cream, and when only a very small proportion of that cream can be reserved as of prime quality, it follows, that unless the quantity of milk were, on the whole, very considerable, the quantity of prime cream produced would be so small as to be scarcely worth the while for manufacturing separately.

Sixth. From these premises, we are led to draw a conclusion extremely different from the opinion that is commonly entertained on this subject, viz. that it seems probable that the very best butter could only be with economy made in those dairies where the making of cheese is the principal object. The reasons are obvious:—If only a small portion of the milk ought to be set apart for butter, all the rest may be made into cheese while the milk is yet warm from the cow, and perfectly sweet; and if only that portion of cream which rises during the first three or four hours after milking is to be reserved for butter, the *rich* milk which is left after that cream is separated, being still nearly quite sweet, may be converted into cheese with as great advantage nearly as the newly drawn milk itself.

Nor does what I here observe tend to invalidate the justness of the commonly received opinion upon this subject, which will in general be just, according to the usual practice of dairy owners in any part of Britain; under whose system of management the making of good butter and good cheese in the same dairy is impracticable. For, where the whole milk is set apart for separating cream, and the whole of the cream is separated, the milk must of necessity be turned sour before it is made into cheese; and I believe that no best cheese can be made from milk that has once attained that state.

It is not, I believe, generally known, that the spontaneous separation of cream and the production of butter is never effected

but in consequence of the production of acid in the milk; and the formation of that acid is accelerated by the separation of fixed air, or, as it is now called, carbonic acid air, from the milk, which is accelerated or retarded by circumstances not usually adverted to. This fact I had occasion to discover during a course of experiments on milk that I made a great many years ago, and that I have above alluded to; which was occasioned by the following circumstances. Having remarked, that of two tea-cups, which contained milk that I knew to be of the same quality by previous experiments, one had the cream upon it at one time of a consistence different from the other; and being at a loss to account for this variation, I tasted the milk in each of the tea-cups and found one of them sensibly more acid than the other. A piece of newly slaked lime having been accidentally nearer to one of the cups than to the other, I began to suspect that it might be occasioned by this circumstance. With a view to ascertain this fact, I immediately caused two tea-cups to be filled with equal quantities of the same milk, and immersed one of the tea-cups up to the brim in a quantity of quick lime that had been so long slaked as to have acquired the same temperature with the air, but was not yet become nearly *effete;* the other tea-cup was placed in the same apartment, at the distance of about a yard from the former. The result was that in the course of twelve hours the milk in the tea-cup placed among the lime tasted so sensibly sourer than the other, that of near a dozen of persons who were desired to taste them, without knowing for what purpose, every one of them pronounced it incontestibly the sourest. The cream also was more perfectly separated from it than the other. It is in consequence of the necessity there is for the forming of acid in the milk, in the process of making butter, that when fanciful people attempt to churn milk newly drawn from the cow, the operation must be continued until this acid be generated, and of course the churning must be protracted much longer than would have been necessary under other circumstances, and this always tends to impair the quality of the butter. Now, as nothing tends so much to impair the quality of cheese as acidity in the milk from which it is made, it must follow that when cream is separated from it *in the usual way* for making butter, the milk must have attained such a degree of acidity as to prove highly detrimental. It must, therefore, be a

destructive practice to make butter in a cheese dairy after the usual manner; but not so in regard to the practice above recommended.

For the ordinary market, I am satisfied, from experience and attentive observation, that if, in general, about half the milk be separated at each milking, and the remainder only be set up for producing cream, and if that milk be allowed to stand to throw up the whole of its cream, even till the milk tastes perceptibly sourish, and if that cream be afterwards carefully managed, the butter thus obtained will be of a quality greatly superior to what can be usually obtained at market, and its quantity not considerably less than if the whole of the milk had been set apart for producing cream. This, therefore, is the practice I should recommend, as most likely to suit the frugal farmer; as his butter, though of a superior quality, could be afforded at a price that would always insure it a rapid sale.

Another advantage would result from this practice, which might in some cases prove highly beneficial: for thus, it is probable, might some particular tastes of milk, that at times affect it and greatly deteriorate the butter, be entirely got rid of, as will appear from the following experiment:—

In the course of the set of experiments on milk above alluded to, I perceived that the milk from one cow tasted exactly as if salt had been put into it. Upon inquiry respecting the cause of this peculiarity, I was informed that the cow in question had missed calf that season, and was still continued in milk over the whole year, and I was farther told, that a salt taste was very frequently perceptible in milk of this kind. Having tasted however some of the last drawn milk, I found it was perfectly sweet, and that the milk of the first drawn cup was excessively salt. This particular strongly roused my attention; and with a view to discover how much of the milk was affected with that salt taste, I caused the whole of the milk to be drawn from the cow into tea-cups, one after the other; and having examined them in the order they were drawn, I found that the first cup was the saltest of any, and that this taste gradually abated in each succeeding cup till about the middle, where it totally disappeared. It is probable, that the nauseous taste from cabbages, turnips, garlic, &c. may affect the milk after the same manner; but other avocations prevented me from bringing it to the test of experiment.

I shall leave this part of the subject, barely mentioning the principal ingredients of milk:—And *first*, It contains an oily matter which may be separated in the form of cream or butter.

Second, A caseous matter which may be separated in the form of curd or cheese.

Third, A saccharine matter, which has never yet been exhibited in its concrete state, because of the rapidity with which in its dilated state, it always rushes forward into the acetous fermentation; and

Fourth, A serous or watery part, which probably is nothing else than pure water impregnated with some of the other ingredients. This is separated in the form of whey and a thin and almost colourless liquor obtained from sour milk.

ON THE TALL OAT-GRASS.

[From Nicholson's Journal, September, 1812.]

THE tall oat-grass, *avena elatior*, grows and produces an abundance of fodder, both in good and bad soils. It is of very early growth, and rises to the height of from two to three feet. Its stalk is fine and slender, and makes very good hay. It is mowed twice a year. If it be eaten green it may be cut oftener, but it is principally cut for hay.

It may be sowed in autumn or in spring, after two ploughings; at the rate of seventy kilderkins, (one hundred fifty-four pounds) to the half *acre*. Frequently saint-foin is sown with it, in the proportion of a hectolitre, (two bushels and three pecks,) of saintfoin and sixty kilderkins, (one hundred thirty two pounds of oat-grass seed to the above quantity of ground.)

It is particularly adapted to horses; but all animals that are commonly fed with hay, eat it with pleasure. Opinions have been so divided respecting this plant, that while several writers have been eager to boast its advantages, others have endeavoured to depreciate it. This difference of opinion respecting a plant of real utility, has risen from the authors who have mentioned it omitting its botanical name. Hence some have confounded it with the ray grass, *lolium perenne*; others with the *way ben-*

net, *hordeum murale*, which has no relation to it, and is one of the very numerous plants injurious to meadows.

I repeat, that the *avena elatior* is the best basis of a natural meadow; and that when cultivated alone it makes an excellent pasture. It is one of the best of the family of grasses, as any one may readily be convinced by observation. It may be known any where by its tender stalk rising above the other grasses, and terminating in pannicles a little drooping.

WHEAT CROPS.

During the last thirty years, few attempts have been made to raise wheat in parts adjacent to the sea coast of Massachusetts proper, and a belief has generally prevailed that no species of this valuable grain could be made to thrive there. As there appeared no other local cause of sufficient importance to account for the failure of the experiments, it was supposed to be owing to some peculiarity in the climate. Since, however, the late more successful attempts of which we now give some account, it is much to be doubted whether we have any reason to complain of our climate in this particular, and may flatter ourselves with raising as good average crops of wheat for the time to come, as are produced in any part of the United States; taking care always to select the proper seed.

From a late communication to the Board of Agriculture in England, it would seem that the crops of winter wheat and some other species have been so often blighted or mildewed as to have occasioned a belief of a change in the climate of that country, and induced many respectable farmers to abandon the raising of wheat altogether. Having ourselves so recently made the discovery, as it is hoped, that the difficulty experienced in raising wheat in this state has been owing more to the qualities of the particular seed employed, than to any thing in the climate unfavourable to wheat crops generally, our attention was the more readily engaged by a paper, the principal object of which is to show, that in order to continue the successful culture of wheat in England, recourse must be had to seed of a species different from any heretofore cultivated among the wheat growers in general.

Mr. Skurray, the author of the communication alluded to, makes known a species of wheat which he and others have cultivated with complete success, on lands in which the winter wheat and some species of spring wheat have wholly failed.

From the description given of this wheat, it is not improbable it may be the same with some of the species which have been raised so successfully, of late years, in the eastern states. The publication of Mr. Skurray's letter here, may induce some gentlemen to send to England for the seed.

We have spoken of the successful culture of some species of spring or summer wheat, and subjoin several letters on the subject from our correspondents. It will be observed that we have been cautious in not giving a name to the wheat lately raised in this vicinity. It is because we think its history is not yet understood. It is generally supposed, that it was introduced into Massachusetts from Londonderry, in New-Hampshire, but where or how it was procured by the people of Londonderry we have not heard. Our uncertainty on this subject has been increased by the subjoined letters of Bezaliel Taft, jr. Esq. and John Jenks, Esq. both of whom procured their wheat at first from Vermont. It would be very desirable to gain some further knowledge of the history of the spring wheat cultivated here, and whether there are more than one species.

ON THE CULTURE OF THE REAL SUMMER WHEAT.

By Charles T. Skurray, Esq. of Devonshire, England.

[From Translations of the Board of Agriculture.]

It has happened rather unfortunately that the many varieties of wheat which have been cultivated in the spring, and thence denominated spring wheats, have proved of a very inferior quality, and the growers have, in consequence, been obliged to sell it at a lower rate than other wheat. This has occasioned so great a dislike to every kind of wheat sown in spring, that it has become a very difficult matter to prevail on a mere practical farmer to sow his land with spring wheat, even if his crop of winter wheat has been destroyed by severe weather, and the numberless acci-

dents to which it is always exposed; he rather prefers sowing his wheat land with either barley, oats or pulse;—of course this system must be productive of an extra quantity of barley, &c. and occasion a great deficiency of bread corn; for wheat must be considered as the food of *four fifths* of the inhabitants of England and Wales. And when there is a failure in our harvest we are under the necessity of importing any deficiency of wheat from foreign countries. The climate of Great Britain has of late years been very unfavorable to the growth of wheat, and it is easy to trace the present high price of grain to this much to be lamented cause. The distempers to which wheat has for many seasons past been liable, are known by the name of blight and mildew. Many farms are now become so subject to one or other of these misfortunes, as to induce the occupiers to abandon the culture of wheat altogether, and numerous instances have occurred within the knowledge of the writer where farmers of substance and respectability have been utterly ruined by the failure of their wheat crops from the above causes.

It will therefore be my endeavour to convince the most prejudiced mind, that the valuable grain, of which I am now treating, is wholly exempt from the mildew in those seasons when common wheat is completely destroyed by it; that it is of superior value to the miller, to the consumer, and to the farmer; that it produces a large return; and is on the whole more profitable than any other corn crop.

Before I proceed to detail the method of culture, I shall briefly state some of the great advantages to be derived from the summer wheat.

First. It may be sown with success the beginning of May.

Secondly. It is the best of all corn as a nurse to clovers and other grasses.

Thirdly. It requires no extraordinary tillage or manure.

Fourthly. It produces a large increase, and is very much approved of by the millers.

Fifthly. The straw makes excellent fodder for cattle.

Sixthly. It is not liable either to rust, mildew or blight and in wet seasons is not apt, as common wheat, to lodge or go down.

After many years experience, I can with confidence assert, that there is no other species of wheat which possesses these important advantages.

Having made these observations, merely to point out the advantages to be derived from it, I shall now proceed to the method of culture.

First. *The description of the grain.* The real summer wheat is somewhat different in its external appearance from that sort usually called spring wheat. It is a small plump grain of a brownish cast; the bran remarkably thin, very heavy, but not what the millers term a bright sample; it has a bearded ear generally; but I suspect this depends greatly on the land, as some soils produce more and longer beards than others, while in some places the beards will in time nearly disappear;—this is a fact I am totally unable to account for. The straw is slender, but never grows very high.

The soil. A tenacious loam suits it well, but any soil that is not too light will yield a crop, provided it is clean, in tolerable heart, and well worked. Wet boggy land wholly improper. The lands in the north of Devon are shallow, light, and rocky; of course not adapted for a wheat crop. The average crop of wheat in that part of the country is about fifteen bushels per acre. The summer wheat has generally produced from twenty-five to thirty bushels in the same land; soil and seasons alike.

The rotation. After turnips, potatoes, cabbages, or any green crop; but where the winter wheat may have failed from any cause whatever, the summer wheat is always sure to succeed I have known it succeed well when a coarse old pasture had been pared and burnt and sown with turnips, the turnips fed off, and summer wheat sown the end of April.

Seed and preparation. About three bushels per acre is the proper quantity, as it has not time to spread so much as winter wheat; but if the land is rich a less quantity of seed will suffice; though under any circumstances less than ten pecks should not be sown. The seed must be prepared with lime and brine in the ordinary way that other seed wheat is; for let it be remembered, that it is fully as liable to smut as common wheat without this salutary and wise precaution. The proper time for sowing is all April sooner or later according to the season.

Harvest. It ripens about the same time as other wheat; thus in four months after sowing, it is harvested; with other wheat, ten months, and in some cases nearly one year is necessary to bring it to perfection. Being short in the straw, it may be mown

with a scythe and bow, like barley; it is thus cut speedily, and at little expense.

Produce. In the west of England where the wheat crops are light compared with other counties, the produce of this wheat is generally ten bushels per acre more than common wheat, even when sown in the same field. The weight of a bushel, Winchester measure, in 1811, was 60¾ pounds; but this was a year when all grain was particularly light. In some cases the writer has had it full 61¼ pounds the Winchester bushel.

The comparative value of summer wheat may be stated as one shilling per bushel above the market price of the best red *Lammas* wheat; in some instances the writer has known it sold to the millers two shillings per bushel more than common white wheat.

But hitherto, in consequence of the growers reserving their summer wheat for seed, (and which I have taken much pains to persuade them to do) but little has been sold to the millers, and that only to ascertain its real value as bread corn. After having proved the quality they would have purchased any quantity of it.

The bread made from it possesses many good qualities, it remains moist long after it is baked; it rises well in the oven, and is very pleasant to the taste. It is supposed by some eminent chemists to contain more gluten or nourishment, than common wheat; it is not, however, so white as bread made from the flour of white wheat. On referring to Duhamel's Elements of Agriculture, I find it there stated, that this species of grain (which he calls summer wheat) has been cultivated in France for a series of years, and the only objection to it appears to be that the work in the spring would be too much hurried by having all the corn to sow at that season.

This, I admit, may, at the first blush, appear an objection, but after due consideration it will not be so formidable as some agriculturalists seem to imagine. The tedious part of the operation in preparing land is ploughing and manuring; therefore if the winter months are employed in ploughing and carting out manure, &c. the process of sowing and covering the seed may be dispatched, when the proper season arrives, without any extra bustle or inconvenience. And instead of committing the seed into a bed of mire in the months of November and December, the lands may be previously laid up in due form to be ready to work the first dry time after the turn of Christmas.

It is much to be apprehended that the late wet autumn has obliged much land to be sown in a wretched condition, and much more to remain unsown to this day. In this case the dependance of the farmer must be on the common wheat sown in the spring, which, I know by experience is but a sorry dependance. Being sown late it of course ripens late, and has to encounter all the risks of blight and mildew. Should it chance to escape these maladies, the short days commence, the sun loses its power, and the rainy weather sets in before the corn is sufficiently ripe to harvest. The loss to the farmer and to the nation is obvious.

In such instances the advantages of the summer wheat must appear conspicuous, and those who had once felt the benefit of it would act unwisely to omit sowing it every year, at least in sufficient quantity to furnish seed to their neighbours and themselves; the great difficulty of procuring that which is really good and genuine, being a strong barrier to its introduction. This wheat came into Devonshire many years ago from either France or Guernsey, and was grown more for curiosity than any other motive. It was in the hands of a few gentlemen only, when my neighbour, the late Mr. Exeter, whose practice in the drill husbandry is so well known, procured a bushel of it for experiment sake. Not being acquainted with its nature, he sowed it at too early a period in the spring, (February and March) when the produce and sample did not meet his approbation the ensuing harvest. He, however, sold small parcels of it to his neighbours, none of whom paid any attention to its peculiar merit. Meeting with a few bushels, in the hands of a farmer, I purchased them, and after repeated experiments I found it a most valuable grain. So conscious now are the farmers in Devonshire of its merits, that it is bought up with avidity in the markets at a very high rate for seed; though previous to my cultivating it on a large scale, the value of it was unknown, both to the farmers and the millers. Within a few years I have grown many hundreds of bushels which I have taken pains to disseminate. Many persons who obtained small quantities of the seed to make trial, have invariably continued the culture of it on an enlarged scale, and there is no single instance, in which it has been fairly tried, that it has failed to answer the expectations of the grower.

Certificates from various individuals who have grown this valuable wheat were forwarded to the London Society of Arts, with some communications from me on the subject, for which I was complimented with an honorary medal.

COMMUNICATION FROM JOHN LOWELL, ESQ. ON WHEAT.

[To the Trustees of Massachusetts Agricultural Society.]

Roxbury, November 20, 1814.

GENTLEMEN,

A WISH having been expressed by the Trustees last spring, in consequence of the successful experiment of Mr. Dudley Hardy upon the culture of wheat in Brighton, (an account of which was published in our Journal last winter,) that many experiments of the same kind should be repeated in different towns near the sea coast and on different soils, I was induced among others to make a trial of this wheat, and although it was made upon a small scale, it was not the less satisfactory.

I had but one small piece of ground in a proper state to receive wheat. It measured one third of an acre. The soil was very thin over a bed of gravel, extremely subject to drought and incapable, as I thought, of bearing a large crop of any sort. Potatoes had been cultivated on it for two years preceding. It had been twice ploughed the fall before, after the potatoes were dug. In the spring four horse cart loads of horse dung were spread upon it and ploughed in. On the seventh day of April, I sowed upon it three quarters of a bushel of Mr. Hardy's wheat. This wheat was of small size and rather shrivelled. It is said to be the same known and cultivated as Londonderry wheat.

The crop looked extremely well, none of it was blighted, and on the second of August it was reaped. The produce was precisely seven bushels and an half. It weighed from fifty-six to fifty-eight pounds the bushel. The same land was again ploughed on the seventh of August, and a crop of clover sown on it. Its appearance is now very good.

Your humble servant,

J. LOWELL.

LETTER FROM HON. J. QUINCY.—*SAME SUBJECT.*

Boston, December 21, 1814.

SIR,

I STATE, in conformity with the wishes of the Agricultural Society, the result of a small experiment made the last season on spring wheat, obtained from Gorham Parsons, Esq. of Brighton.

In March, as soon as the frost would permit, I ploughed a measured acre; carted on about ten loads of manure, the usual quantity for a barley crop; steeped one bushel of wheat in the drainings of a common heap; sowed and harrowed it into the ground.

The product was fifteen bushels of good wheat.

No blast or smut was perceived on the wheat. It weighed sixty pounds to the bushel.

Some stalks of rye having sprung up with the wheat, I examined them and found every head blasted.

My land adjoined the bay, and was a clayey loam.

Respectfully,

I am your obedient servant,

JOSIAH QUINCY.

To the Corresponding Secretary.

FROM HON. P. C. BROOKS.—*SAME SUBJECT.*

Medford, November 26, 1814.

DEAR SIR,

I ATTEMPTED this year to raise the spring wheat. I had a bushel of seed from Brighton. After having it soaked twenty-four hours in ashes-ley, it was sown on an acre of ground on which Indian corn had been planted for two years. The land was prepared as it is commonly done for barley and grass-seed. On the first day of August the wheat was reaped, and soon after threshed; but though the kernel was plump, and the weight sixty-four pounds the bushel, yet the crop was very small. It did not exceed fourteen bushels. I feel confident, however, that

I should have had several bushels more if my field had not been injured by the charloc or wild turnip; and I am so much encouraged by the experiment, that I intend next year to try it again, in preference to barley.

I am, &c.

P. C. BROOKS.

FROM BEZALIEL TAFT, JR. ESQ.—*SAME SUBJECT.*

Uxbridge, November 19, 1814.

DEAR SIR,

I DID not observe your communication, in the Repertory, of the 22d ult. until within a few days, and embrace the first leisure moment to communicate such information, on the subject, to which you refer, as results from my own observation and the experience of my father and self.

Until within about fifteen years it was thought impracticable to raise wheat, in this town, on account of the blast which usually rendered the crop of little or no value. I presume for the first five, of the last twenty years, there were not five bushels raised annually in this town.

About fifteen years since, my father procured a bushel of spring wheat from Barry, on the Onion river, in the state of Vermont. The produce of that seed was such as to induce him to repeat the experiment; having threshed about fifteen bushels of good plump, full kernelled wheat, the increase of the one bushel sown.

He continued to procure his seed from the same place for several years, and attributed his success to that cause. But finding it attended with inconvenience to procure an annual supply from such a distance, we at length sowed the seed of our own growth; paying, however, more particular attention to the seed before committing it to the ground.

For the last ten years we have sown the seed of our own growth, preparing it in the following manner. We have, in the first place, washed the seed intended for sowing clean, stirring it well in two or three changes of water. Having washed the

grain, we have then soaked it about twelve hours, in what women, who make soap from ashes, call a weak ley. After turning off the ley we have stirred in about two quarts of slaked lime to one bushel of wheat.

The object of washing the seed is, to prevent smut, and we are confident it has that effect, as we have seldom seen a head injured in that way, since we adopted the above mode of preparing the seed. The benefit resulting from soaking in ley, is perhaps too obvious to mention. The kernel is swollen and vegetates sooner than it would if committed to the ground in a dry state. The advantage to be derived from the application of the lime is extremely similar. It adheres to the seed, forming a rich and pungent envelope, defending it from insects and producing a vigorous blade; bringing it to maturity before the cold commences, which we frequently experience early in August.

We have invariably selected for the cultivation of wheat, such ground as would be the most sure of producing a good crop of Indian corn. A dryish soil admitting of an early application of the plough we consider preferable, and we endeavour to sow it as early in the spring as we can stir the ground, and have it remain light.

We calculate to sow about five pecks of seed to an acre, and our crops have been from twelve to twenty two bushels. I believe that sixteen bushels per acre has been about an average yield.

The success attending our endeavour to cultivate this valuable species of grain, has induced many of our neighbours to try the experiment, which has resulted in a full conviction that, on our soil, we can raise more bushels of wheat per acre than of rye; that it is much less liable to blast, and worth at least one third more per bushel for the actual support of a family, without regarding the superiority of the flour in point of comfort and luxury.

For the last three years, I believe this town has produced annually about a thousand bushels, and the last season we had at least four times as many bushels of wheat as of rye from the same number of acres in the same state.

I have now answered all the queries proposed in your communications above referred to. You will now permit me to suggest one or two remarks not inapplicable to the subject.

I consider wheat a valuable kind of grain to sow on ground intended for a crop of grass the succeeding year; more favorable to the future crop than rye or oats.

It is well known to every farmer, that our grass is frequently killed immediately after the crop of English grain is taken off of the ground, by exposing the tender plant to a scorching sun, at a season of the year, when the ground is most likely to be parched with drought. As the wheat straw is not so tall as rye, and not so thickly covered with leaves as the oat plant, the change is less severe when the crop is removed, and the grass scarcely experiences any ill effect.

I would likewise remark, that we invariably wash our wheat before sending it to the mill. This may appear unnecessary when the grain is not injured by mildew. But in our part of the state, and I believe in the Commonwealth generally, our soil is rather sandy; much more so than is common in the middle and western states, where wheat is cultivated in abundance. Such being the case, it is impossible to gather our grain and thresh it without its being covered in some degree with dust, which is hurtful to the flour.

The expense of washing is very inconsiderable. An active man will wash ten bushels in two or three hours. Care ought to be taken not to have it remain longer than necessary in the water. We usually dry it on blankets or sheets in the sun. Care should likewise be taken not to have it get too dry, as the flour in that case is not so nice. One day's sun is sufficient to dry it in the summer, and two in the fall. If suffered to become too dry the hull or bran is brittle and cuts to pieces in grinding, so as to mix with the flour. When only dried sufficient to prevent its clogging the mill, the flour separates much better from the bran, and is far preferable for use.

If, from what I have now said, any other question should occur, if you will do me the honour to address me a line on the subject, I shall be happy in giving you any information in my power on a subject of such high importance to my fellow citizens. I have written in haste, and you will be so good as to excuse inaccuraces.

I am, &c.

BEZALIEL TAFT, Jr.

To the Corresponding Secretary.

FROM MR. JOHN JENKS.—*SAME SUBJECT.*

Salem, November 3, 1814.

SIR,

Noticing in the Palladium a request to those, who had raised wheat this season in the vicinity of the sea coast, to make some communication thereon to the Agricultural Society, I have taken the liberty to make the following statement; hoping it may be useful to some of my fellow-citizens that they may make exertions to remove our dependance upon the southern states for our wheat or flour. Last winter I purchased in the market of a person from Vermont some wheat, with an intention of making a trial to raise a crop the ensuing season, therefore I was very particular in my inquiry what kind it was? (*Summer bearded wheat*, was the kind I wanted.) The man assured me this was of that kind, for he raised it himself from seed he sowed in the spring of 1813. I purchased four bushels. Upon his emptying it from the bags, I observed to him, that there was a mixture in the grain of some oats, barley, and rye; he replied, that there was some oats that grew with the wheat, but the barley and rye he supposed got amongst it by the wheat's being threshed upon the same floor where he threshed his barley and rye. Being determined to have my wheat clear from every other grain, I had it picked over by hand to separate it from every other kind of grain, (and a tedious job indeed it was.) Having effected the separation, I measured the wheat and found it one peck short, in consequence of the foul seed; then I procured another peck to make up my quantity of four bushels for the two acres. Being doubtful as to the quality of this peck, I kept apart and sowed it by itself. Upon inquiry of the Vermont man, respecting the time he sowed the wheat, he said he generally sowed this kind as early in April as the frost would let him get it into the ground; consequently I judged that if in Vermont he sowed early in April, I might get my seed into the ground in March, but the frost would not admit of my ploughing until the 30th of March, and even then some spots would not admit the plough. Having ploughed it, I harrowed it over and let it lay three days to dry, as the weather was fair. I measured off

my ground exactly two acres; with respect to the seed, I took two bushels and put it into a tub, with weak ley, made from wood ashes, and one and three quarters of a bushel in another tub with sea-water, and let both soak just eight hours; then I drained off the waters and spread the wheat upon a tight floor, and sprinkled slaked lime upon it and raked it over until it was all covered with the lime and dry, it then appeared all over white as rice. I kept both parcels apart and had them sowed apart, to see what effect it would have upon the produce, but upon a close examination through the season, I could not perceive any material difference as to the growth or produce. The peck I procured to make up my quantity for the two acres, I soaked in weak ley only an hour, and then limed and sowed it by itself upon a quarter of an acre adjoining the land already sown, (only making up the two acres,) this was much blighted and produced little in comparison with the other part of the two acres.

The first week in August, I had it reaped and housed. I was particular to examine the wheat upon the one and three quarters of the acre, found no blight and but very few heads smutted, (so called.) As soon as convenient I had it threshed out and measured, found the produce to be forty-four bushels of well grown wheat. The seed I sowed weighed sixty pounds to the bushel; my produce when first threshed out weighed sixty two pounds the bushel. The land on which this grew, is a good dark, rich mould, within about one hundred rods of a salt marsh; yet I do not think it any way impregnated with the salt water. I have improved it for mowing only about twenty years until 1813, when I had five acres broken up and planted with Indian corn, the produce of which was three hundred bushels. This year when I sowed the wheat, I had herd's-grass and clover sowed with it to lay down the two acres; the grass was well grown and the ground wholly covered when the wheat was reaped. I mention this circumstance, as I think if no grass had been sown the crop of wheat might have been better, both as to quantity and size of the grain.

I have washed and dried three bushels of the wheat, and had it ground and bolted, and it yielded one hundred and four pounds of fine flour, as good and as white as New-York flour is in general; if we had burr stones and good bolting cloths, I doubt

not but it would compare with any Philadelphia or Baltimore superfine. You will please to excuse my prolixity, but it is my hobby, and you must permit me to ride a little. I have this season also made a little experiment upon 7-8ths of an acre, with seven pecks of *a bald six rowed barley*. What my produce is exactly I cannot now say, but upon an acre and 3-5ths, the produce this season was fifty-five bushels, not having wholly got through the thrashing and cleaning. I have also had three bushels of this barley ground; one bushel was bolted and produced a good flour; the other two bushels was well ground, and has been used with wheat middlings, instead of rye with Indian; it makes bread as good as rye and Indian, not quite so adhesive, but dryer and short; this grain is very productive, not subject to blight as rye is, and it weighs sixty pounds to the bushel.

In February, 1813, a gentleman returned from France and brought with him some barley, (much larger than the above described,) and this also is *bald*. I received about two spoonfuls, which I sowed in a bed in rows as we do carrots; this produced about three pints, of which I gave away a pint. And this season I sowed the quart in rows, sixteen inches apart, and each grain four inches apart, and had the rows kept clear of weeds and hoed; the product of this quart is about three pecks. Each ear or head will average about twenty-three kernels, and weighs fifteen grains; of the other kind, forty-nine kernels weighs fifteen grains, yet I think the smallest barley the most profitable, and will produce the greatest quantity upon the same ground; for I observed that the small barley produced more by double the number of stalks upon one root than the large two rowed barley. I have heard that E. Prebble, Esq. has raised some large barley; perhaps it is of the same kind that I have mentioned. I have enclosed a sample of the kind, but under an opinion, that the Society are not unacquainted with this species of barley.

I am, &c.

JOHN JENKS.

P. S. Some manure of barn compost was spread upon the land before it was ploughed for sowing the wheat, and ploughed in about two cart loads to an acre.

To the Corresponding Secretary.

ON THE INFLUENCE OF SOIL AND CLIMATE UPON WOOL.

BY ROBERT BAKEWELL.

CHAPTER I.

On the soft and hard qualities of wool, and the great difference in the value of cloth made from these wools, although each sort may be equally fine—Distinction between hair aud wool, &c.

Wool may be found on some sheep, which, if grown on any other animal, would be called what it really is, hair; the same animal will produce in other parts of its fleece, true sheep's wool. Some animals, as the vicuna, the Angora goat, &c. though they produce coarse, long hair, produce also other hair so silky, soft and fine, as justly to entitle it to be called wool; being in these qualities superior to the finest Spanish or Saxony sheep's wool. The yak of Tartary, of which there is a description and plate in Turner's Account of Tibet, appears to be a species of wool-bearing ox. The oxen of Hudson's Bay also, if naturalists rightly inform us, produce a wool finer and softer than the vigonia or vicuna wool; it must be therefore the finest wool hitherto known. The peculiarity which has given the name of wool to some kinds of hair, is the smallness, softness, and pliability of the fibre, whence it is capable of being spun, and woven into a cloth which will *felt* or *mill* into one uniform texture, and by the process of fulling, will cover the surface of the thread with a pile. When the hair of any animal is too hard and elastic to admit of the same effect being produced by a similar process, we cease to call it wool. Now *some wool has a much nearer resemblance to hair in the hardness and elasticity of its fibre, than other wool equally fine.* Cloth made from such wool, is hard and harsh to the touch, loose in its texture, and the surface of the thread is bare.

Hence, it is much less valuable than cloth made from the softer wools. The difference in the quality and value of two peices of cloth, manufactured in the same manner from wools possessing the same degree of fineness, will be much greater than is generally known, or than those not well acquainted with the fact would be inclined to believe.

Nor is the subject fully known to many engaged in the woollen manufacture; but it is better understood than it was a few years since, and the soft silky quality is now more highly valued. This may be traced to the improvements which the introduction of machinery has effected in the cloth manufactory, and also to the different manner in which fine cloth is now finished. Formerly the manufacturer, in showing his cloth, was more anxious to exhibit the fineness of the thread than prove the softness of the pile. For this purpose he used to scrape off the pile from a small part of the cloth, to display the smallness and regularity of the spinning: since he has been enabled by machinery to spin a small even thread with great facility, the practice is discontinued. Cloth is now finished without that hard, shining surface, which was given to it a few years since by hot-pressing, which prevented the softness of the pile from being felt. By the present mode of cold-pressing, the softness of the pile becomes immediately perceptible to the touch, and is considered as one of the most distinguishing and essential qualities of a good cloth. The division of labour may also have prevented the value of the softer wool from being sooner known. The wool buyer in the distant counties, and the wool stapler who sorts the fleece, are generally unacquainted with the cloth manufactory. The Yorkshire manufacturer sells his cloth in the undressed state; it is bought and finished by the cloth merchant, who formerly was unacquainted with the process of the manufacture and the qualities of wool. If in a promiscuous parcel of undressed cloths bought at the same price, and apparently of the same quality, some were finished much better, and softer than others, it was attributed to lucky chance—the patron divinity of the ignorant. A spirit of investigation is now prevalent; many of the cloth merchants have also become manufacturers, and have an opportunity of observing the effects which the hardness or softness of the wool produces on the cloth in a finished state. From some or all of these causes, the value of soft wool is better understood,

and has greatly increased. It may be affirmed, that taking two packs of sorted wool of the same apparent fineness, one possessing in an eminent degree the soft quality, the other of the hard kind, the former will, with the same expense to the manufacturer, make a cloth, the value of which shall exceed the latter full twenty-five per cent.

The improvement of this quality of the wool, must therefore be of much importance to the wool-grower and manufacturer. It has hitherto been little understood, or attended to; to show how it may be obtained, is the principal object of the present work. As connected with the same object, I shall also notice the other qualities of wool, on which the external action of soil or climate have any influence.

It will invariably be found, whenever lime or calcareous earths come in contact with wool, they deprive it of its soft quality by their action on the surface of the fibre. A demonstrative proof of this effect is offered, in the process of separating the wool from the skins by the fell-monger. The pelts are steeped some days in lime and water; the softest wools, when thus exposed to the action of lime, lose their distinguishing excellence, and acquire all the harshness of wools grown on limestone soils. The hard wools have this quality increased by the same operation; hence the value of skin wool is considerably less than that of fleece wool equally fine. This fact alone is decisive, and proves, that the hardness of wools in limestone districts is occasioned by the external action of the soil, and not by the food of sheep. Nor will it be difficult to ascertain, in what manner the lime acts upon the wool: it absorbs the natural grease or yolk of the fleece, and forms with it an imperfect soap, which is miscible with water, and easily washed away by the rain. The wool, thus deprived of the unctuous cover intended to keep it soft and pliable, is exposed to the air and rain, and the staple is laid bare to the caustic operation of calcareous earth.

Argillaceous or clay soils are more favorable to the production of soft wool. Clays have an unctuous, saponaceous feel, and they possess not the caustic absorbent qualities of lime. Sandy soils may fill the fleece with siliceous particles, but these particles will not combine like lime with the yolk, and absorb the unctuous covering of the wool. In the process of the fell-monger above stated, the same effect is produced in a few days

by the application of lime in a more caustic state, as that which takes place from the slow but constant operation of the lime-stone soil on the growing fleece. A similar change also takes place on shorn wool kept long in a very warm and dry temperature; the fibres become indurated and elastic, and acquire the properties of the hard wools. The greater the degree of warmth, the more speedily will the effect be produced. If wool be exposed for a few minutes to a degree of heat just below what would scorch and discolour it, it will never regain its former state of softness and pliability. The useful arts may here receive an illustration from the curling irons of the frizeur, or the more durable effect of baking the hair, practised by the peruke-maker. It is twisted round small tubes or pieces of tobacco-pipe, and kept in an oven moderately heated, by which it becomes sufficiently hard and elastic to retain a permanent curl. It is well known to cloth manufacturers, that wool which has been shorn three or four years, will not spin or felt so well as when kept only one year. A dry situation is necessary for the preservation of wool, but after a certain time, it loses the natural moisture of the fleece, and becomes hard, like the wool from limestone districts.

Dr. Parry says he is informed by the cloth manufacturers in the west of England, that in very hot dry weather, they cannot make a piece of cloth from Spanish wool so good in appearance by nearly two shillings a yard, as it would be if made in a cooler, moister season. He adds "so far as I can learn, the heat and drought render the wool more intractable and elastic." In Yorkshire, it is well known that cloth dried in hot weather, or in an over-heated stove, will not finish so well, or feel so soft, as that which is dried by a more moderate degree of warmth, and in a moister state of the atmosphere.

I have purposely omitted to state the injurious effects of extreme heat on the soft quality of the growing fleece, as I intend to confine the first chapters to objects of practical utility. In our temperate latitude, this cause can rarely produce any injury.*

* But temperate as the latitude may be, it is still produced. The wool of our merino sheep, after shear-time, is hard and coarse to such a degree, as to render it impossible to suppose that the same animal could bear wool so opposite in quality, compared to that which had been

An examination of the African fleeces would, however, change the opinion of those who deny the effect of climate on wool. In many of the African sheep, there is evidently a tendency to produce fine, valuable wool, and I have no doubt they would do it, if removed to a more favorable situation. All these fleeces have lost their soft quality, and mill or felt with great difficulty; the yolk has been absorbed by an arid soil, and the wool nearly baked by a parching sun.

The experiment of producing fine wool from Spanish sheep, has been fairly tried in Saxony for nearly half a century. I have had in my possession, and carefully examined, many hundreds of these fleeces, which equal in fineness, the very finest Spanish wool I ever saw. The wool is true grown, viz. there is but a very small quantity of an inferior quality in any part of the fleece. It is also entirely free from a coarse silvery hair running through the fleece, common to many piles of Spanish wool. It will spin finer, when carded, than Spanish wool, and is suited for light kerseymeres, pelisse cloths, &c. The price, if due allowance be made for extra waste and for the wool being unsorted, exceeds this year that of the best Spanish wool. It is sold in England, at this time, for 6*s*. 8*d*. and 6*s*. 6*d*. per pound in the fleece, which is washed on the back of the sheep; but is cleaner than the general run of English fleeces. In this state, the average weight is nearly one pound and three quarters to two pounds. This may surely afford sufficient encouragement to those who are desirous of improving our fine clothing wools. With the above admissions, I must however observe, that in some valuable qualities, the wools of Saxony are inferior to the Spanish, and I have little doubt this is occasioned by the influence of climate. This wool is less sound in the staple than Spanish wool, nor will it make a cloth of equal firmness and durability. From frequent examination of Saxony fleeces, I am persuaded that their supply of yolk is not so copious as in the native Spanish

clipt from it in the course of the same season. As the cold weather advances, the fleeces recover their soft quality. Whether this harsh feel of the wool in its earliest growth arises, supposing that it cannot be the effect of chalk, from the heat of the sun, or the absorption of the yolk, we know not, but such is the undoubted effect; it is probable, however, that it will be more obvious in the finer piles, where the yolk usually abounds, than in the coarser ones, which are destitute of it.—*Somerville.*

sheep, nor is the wool grown so close upon the skin. In general appearances, these fleeces nearly resemble those of the best Norfolk; they are much finer, but a good judge of wool would have no hesitation in saying they were grown on a soil and in a climate nearly similar. Hence it may be fair to infer, that the soil and climate have effected a change, and assimilated them to other wool under the same influence. The want of soundness in the staple would be a great defect in the Saxony wool, for the general purposes of the cloth manufacturer. It may arise from occasional deficiency of food, from extreme cold, or from the fleeces being long and frequently exposed to rain.

To preserve all the best qualities of wool from the Spanish breed of sheep, it will be necessary to attend to three objects. The first in importance is the purity of the breed, which can only be preserved by the greatest care, and by the nicest judgment in selecting the rams and ewes. Secondly, to observe that the fleece be covered by nature with a copious yolk; and where this is deficient, that it be supplied by art: nor should we suffer the unctuous covering of the wool to be absorbed by a mixture with the soil on fallow lands, or washed away by the rain; to this the ointment will be less liable than the natural yolk. It is also necessary that the sheep be kept dry, and sheltered from the extremes of heat and cold. The third object is, to regulate the quantity of nourishment given to sheep.

The first of these objects I must leave to the intelligent woolgrowers. The second I have already adverted to, as far as relates to the covering of the wool, and it is not my province to point out to the practical farmer the exact manner in which he may best provide a convenient shelter for his sheep; the buildings, however, for this purpose, should have near the roof, sliding doors or windows on each side, to admit air in any direction, and to regulate the warmth. The practice of cotting, or housing the sheep at night, was found to be very beneficial to the wool. I am informed by my friend Mr. S. Wilkins, of Cirencester, that where cotting has been discontinued in Herefordshire, the wools have considerably deteriorated. I am surprised this practice, so necessary in our climate, has not been more general; and still more so, that it should be relinquished where the growth of fine wool was an object of importance. If there be any truth in what I have hitherto advanced, it is obvious that housing the sheep at

night, and providing them during the day a shelter from the rain and sun, must preserve and improve the wool; and would also essentially conduce to the health, comfort, and preservation of the animal.

The third object to be attended to, is the quantity of food. As a considerable difference of opinion exists with respect to the effect of food on the fineness of wool, and as the question is still *sub judice*, I shall be excused in stating my own observations on this subject. A sudden removal to a rich luxuriant pasture, has a tendency to increase the fleece, and make the wool coarser. I assert this from repeated examinations of its effect on forest sheep removed into pastures to fatten. I believe some breeds of sheep resist this effect more than others, and the Spanish perhaps more than our native sheep.* I have stated that this effect is occasioned by a removal from a poor to a rich pasture. I do not, however, by this mean to assert, that some breeds of sheep will not produce fine wool when plentifully supplied with nutritious food. This may be the case with the Trashumantes, or fine-wooled travelling sheep in Spain, which are said by some writers to exceed in fatness the stationary coarse-wooled ones. It is not the absolute quantity of food which animals consume, but the proportion of nourishment each species may contain, that we ought to attend to. If food be supplied in nearly the usual quantity, and be of a kind on which the animal will thrive, it will produce no change in the wool, and it is of little consequence whether it be given in the form of grass, hay, or turnips; whether in enclosures or open fields. I admit with Dr. Parry, that the great and sudden change which appears to take place after enclosures in the

* This effect has been ascertained on my own flock for many years past; not only on the Merino and Ryeland, but on the wether sheep of the pure Merino race, to the number, the mixed breed included, of many hundred sheep every year. These sheep have been constantly depastured on very rich marsh land during the summer months, and no degeneracy in the wool has resulted, but on the contrary an improvement; such is the opinion of those who purchased it; perhaps they considered the wool less incumbered with dirt and more full of yolk, and therefore gave it the preference. The causes of this, however, with other details, will form part of a statement to be published hereafter, in continuation of a former work on this subject, which I thought it my duty to make public.—*Somerville.*

quality of wool, is generally occasioned by the introduction of a heavier breed of sheep. Were it the interest of the farmer to grow fine wool in the same situation, he might effect it by a careful attention to the breed, and by limiting the quantity of food given to his sheep. That the latter circumstance is necessary to be attended to, was the opinion of Mr. Bakewell of Dishley: he said to me the year before his death, "he had no doubt that fine wools might be grown on rich pasture lands by overstocking them, and preventing sheep from obtaining more nourishment than they had been accustomed to." I state this, because I am apprehensive that the opinion of Mr. Bakewell on this subject, has been mistaken by Mr. Turner, who is quoted by Dr. Parry as an authority, that Mr. Bakewell did not admit the effect of food or climate on wool. It is probable that Mr Bakewell had stated, that different kinds of food made no alteration in the wool, for it was not the kind of food, but the nourishment it contained, to which he attributed any effect on the wool. Until the change occasioned by rich pastures on the wool of Spanish sheep be fully ascertained, it would be desirable that they should be supplied with nearly the same quantity of nourishment to which the parent flocks have been accustomed, provided that this be sufficient to keep them in a healthy state. Baron Schultz, in his account of the sheep of Sweden, informs us, that some of their fleeces may be increased from two pounds to four pounds by an increase of food. M. Fink, although he does not admit that increase of food injures the quality of the Saxony fleeces, yet he allows it will increase their quantity. It must do this either by lengthening the staple, or by enlarging the thickness of the fibre: in other words, it must make the wool longer or coarser; in some instances it may do both. There is one undeniable fact, which may silence every doubt on this subject, as it is not an inference from any partial or local observation, but is proved by the general experience of wool-buyers in every part of our Island. After a fine open winter, a greater quantity of wool is produced, than when the season has been severe; in some instances, the difference will amount to full one-fifth of the aggregate weight of the whole quantity of wool grown in the kingdom. The fleeces at such times are considerably larger, but the wool is always coarser; as the wool-sorter knows by long and constant experience.

The enlargement of the fleece, and the increased coarsness of its hair after a mild winter, are chiefly occasioned by the greater quantity of food which sheep obtain at such seasons, when vegetation has been but little checked by severe frosts. Farmers who have flocks of the long-woolled breed, and are accustomed to supply their sheep with plenty of food during winter, sometimes trust too much to the mildness of the season, and withold this supply altogether. Hence some lots of wool are not unfrequently found to be lighter after a mild, than after a severe winter; the fleeces will be jointed in the staple, and finer in the hair near the joint. Such wool is rendered unsuitable for the comb. The farmer is generally willing to acknowledge the cause of this defect. I bring this instance of the effect of increase and decrease of food on long combing wool; because in such wools, the changes they occasion are more striking and perceptible to those unaccustomed to minute and nice examinations of the fibres of wool.

Excessive heat is highly injurious to wool; in our temperate latitudes, it may be unnecessary to direct the attention of the wool-grower to its operation; but I will however venture to assert, *that in proportion to the regularity of the temperature in which sheep are kept, and to the regular supply of nourishment they receive, will the hair or fibre of the wool preserve a regular, even degree of fineness.* From an observation of the wools of Africa, I am convinced that the arid soil destroys their softness, and the parching heats produce great irregularity in the fineness of the hair. In Portugal, where the same attention is not given to sheep as in Spain, and they are more exposed to the summer heats, the wool is less regularly fine, and more intermixed with coarse silvery hairs. A cool moderate temperature is more favorable to the production of fine wool than excessive heat; and were the sheep of Spain, like those of England, unprotected against the effects of climate, I should have no hesitation in saying, that the situation of that country would be in some respects worse than that of our own Island, and more unfriendly to the growth of a fine even staple. But to the other qualities, the soundness and softness of the fibre, our frequent rains are very prejudicial, unless the sheep be sheltered and defended from their effects. This only proves, that greater attention is required to external causes acting upon the fleece than has hitherto been thought necessary in England. With due precautions to counteract these

causes when prejudicial, I have no doubt fine wool will continue to be grown in Britain, equal in every good quality to the Spanish or Saxony fleeces. The prejudices of the manufacturers on this subject, must yield to repeated proofs; and the time will come, when they will reflect with gratitude on the exertions of those distinguished characters in the present reign, who have, by a judicious attention to the breed of sheep, done so much to improve the wool of their native country.

CHAPTER II.

On the formation of Wool, Hair and Silk. Observations of Mr. Lewenhoeck. On the Roots of Hair. On the felting quality of Wool and Hair. Opinion of M. Monge respecting it. An Experiment to ascertain its Truth. On the Furs of different Animals, and the causes which occasion the same hair to be grown coarser or finer at different Seasons. On the Defects of Wool. The jointed Staple. Cotted fleeces, &c. The effect of Climate on Wool. Improvement and Application of the Furs of different Animals. On the formation of Feathers. Cause of the Moult. Microscopical Observations. Hints from Nature for the Improvement of Wool.

THE preceding chapter was confined to objects of practical utility, and I have endeavoured to avoid the intermixture of speculative inquiries in what has been advanced.

In the present chapter I shall attempt to bring some illustrations from analogous facts, and to state some microscopical observations, tending to confirm my conjecture respecting the structure and formation of wool. I offer them as hints to excite the curiosity and direct the attention of future inquiries to this subject.

An acquaintance with the formation of wool and the structure of its component parts, could not fail to be of some use, both to the wool-grower and the manufacturer: it might assist the former in his endeavours to improve its qualities, and guide the operations of the latter when he wanted to produce effects depending on some of its properties, which are not clearly understood or sufficiently attended to.

I have stated my opinion, that wool and hair are formed from the same fluid, but differently modified by the secreting vessels,

and thus possessing different degrees of elasticity and induration. I suppose each hai or fibre to be secreted from the albumen by imperceptibly minute vessels uniting in others still larger, till the different filaments secreted from each, are united and collected into one excreting duct near the surface of the skin. The filaments thus collected in a viscous state, probably acquire consistence by the absorption of oxygen, and become a solid fibre or thread, which is protruded in the form of wool or hair. Each fibre, whether of wool or hair, is thus composed of a number of minute filaments, laying parallel, and closely adhering to each other. The adhesion of these filaments in some hairs, is too close to admit them to be perceived by the microscope; in others they may be distinctly seen, and in the large hairs of some animals, they may even be separated and subdivided to a certain extent.

The formation of silk I believe to be nearly analogous to that of wool, but it takes place externally and visibly. M. Jaquin, professor of chemistry at Vienna, informs us that "silk, the web of all other caterpillars, and the silk of the *barba pinnæ marinæ*, are chemically considered almost the same substance as wool, from which they differ merely because they are less susceptible of colours, and on account of some peculiar properties when dyed." Mr. Lewenhoeck observed that the spider has five large papillæ, or what he calls working instruments, from whence five threads of viscous matter issue, which immediately unite and become one solid thread. These five threads are each of them composed of a great number of other filaments inconceivably small, which unite as they are spun out. Mr. Lewenhoeck says there are sometimes not less than four hundred small threads uniting together to form the last thread. The reason of this division of the viscous matter into such minute filaments, he states to be, that it might by such minute division acquire immediate solidity by contact with the air, and also that the thread might possess flexibility; for he adds, "as the spider's web to the naked eye, appears single, yet consists of a great number of other threads, and thereby acquires greater strength; we may from hence conclude that no flexible bodies, except metals, can attain to any degree of strength, unless they consist of long united parts, and the more these parts are twisted or cemented together, the stronger they are, which is very obvious in flax, silken thread,

ropes, &c. And thus also hair or wool, according to its fineness, has more or less strength, because each of these hairs consists of longer and finer parts, which are united by a viscous matter. It is necessary, he observes, to make a thread so strong and thick as those of the spider's web, with the viscous matter thrown out of the animals body, that it should be divided into a great number of small threads, to be immediately consolidated by the air. One hundred of these small threads will not make one hundredth part of the thickness of a single hair of the head.

On examining the roots of hairs which have been recently plucked out, I have sometimes seen with the microscope, several distinct small fibres uniting and joining at the bottom of the hair. I have no doubt a great many more would have been perceptible, had they not been broken off close to the bottom in separating it from the body. These fibres were nearly transparent. In all microscopical observations on wool and hair, the greatest attention is requisite, to prevent any optical illusion from their semi-transparency. The first appearance of a bright line running up the hair, has induced many to suppose it was a hollow tube. This deception arises from the refraction of the rays of light on the sides of the hair; a solid thread of glass will present exactly the same appearance.

I was not aware, when I first formed this opinion respecting the structure of wool, that it was confirmed by the authority of that minute and accurate observer of nature, Lewenhoeck. He says, "Each fibre of hair and wool consists of long and finer parts united together by a viscous cement, and covered with a crust or bark." This is probably merely the same viscous cement spread over its surface.

The observations of M. Bon, on spiders and spider's silk, confirm the discoveries of Lewenhoeck. The formation of wool takes place by a slower and more gradual process under the skin of the animal. Silk acquires immediate solidity by contact with the air, owing, as has been before stated, to its filaments being so extremely minute.

The fibres of wool and hair being thicker, require a longer time to become solid by desiccation, or by the absorption of oxygen. That oxygen can be absorbed through the surface of the skin, is evident from the well known experiment of placing dark venous blood in a closed bladder, and exposing it to the action of

oxygen gas, where it acquires the bright red colour of arterial blood, notwithstanding the interposition of the bladder.

The minute vessels which secrete the wool or hair-forming fluid, unite in the excreting duct near the surface of the skin, where the hair or fibre is formed. The duct has the appearance of a bulb in the roots of human hair, with an opening nearly similar in form to the mouth of a trumpet, from whence the hair is protruded. It is not improbable, that the hair may receive, by the alternate constriction and expansion of the orifice of the duct through which it passes, minute indentations or ridges on its surface, which occasion the roughness we feel when it is drawn through the fingers from the point to the root. To this peculiarity of the surface, M. Monge attributes the felting quality of wool and hair. (*See Ann. de Chymie, tom.* vi. *p.* 300, &c.)

"The felting of wool or hair, is an effect resulting from the external conformation of their fibres, which appear to be formed either of small lamina placed over each other, in a slanting direction from the root towards the end or point of each fibre, like the scales of fish lying one over the other in succession from the head to the tail; or of zones placed one upon another, as in the horns of animals; from which structure each fibre, if drawn from its root towards its point, will pass smoothly through the fingers, but if it be drawn in a contrary direction from the point towards the root, a sensible resistance and tremulous motion will be felt by the fingers. This peculiar conformation disposes the fibres to catch hold of each other, and as they cannot recede when acted upon by other bodies, they naturally advance by a progressive motion from the root towards the end."

The hairs of wool, when carded and spun, are laid in every direction, and when they are compressed and agitated, this disposition to catch each other, and move from the point to the root, must inevitably bring the whole mass closer together. This is the case when cloth is fulled or milled, by which it is shortened both in length and breadth. Not being perfectly satisfied with the account given by M. Monge, I adopted a very simple experiment to ascertain its truth: I took a staple of coarse wool, of considerable length, with the hairs laying regularly in one direction. At the distance of an inch from each end, I made a tight ligature with a thread; I measured the middle of the staple between the threads, and then proceeded to mill it, by compressing

it with my hand in a solution of soap and warm water. I continued the operation until each end of the staple beyond the thread was felted into a hard knob or button, which could not be separated by the fingers. The middle of the staple remained unfelted, the hairs quite distinct from each other, and it was not in the least shortened by the process, either in the wet state or when dried. In the middle part of the staple, between the two threads, the hairs were kept in the same direction by being tied, and could not acquire the retrograde motion, or adhere by the surfaces catching hold of each other. The hairs at the end of the staple being at liberty to double and move in different directions, were soon felted together into a smooth hard and round knob, in which the ends or points of the wool were entirely buried.

It is possible that lime may injure the felting quality of wool, by depriving it of its moisture, and making it more elastic; and also by its causticity, it may destroy the extremely minute ridges on its surface, on which its felting quality depends.

The cause of the felting quality of wool and hair is little understood or attended to, and involved in some obscurity; I may, therefore, be excused for dwelling upon it, as it is of considerable importance in the cloth and hat manufactory. That the felting quality depends on the tendency of the hair or fibre to move in one direction when repeatedly pressed, I have little doubt; but whether this is occasioned by indentations, or by rings, or zones, or any inequality of the surface, will not admit of proof, as they cannot be discovered by the microscope, though we can feel a sensible degree of roughness when hair is drawn from its points to the root between the fingers. The sensation excited, is somewhat similar to the vibration felt in drawing the point of the finger over the smooth edge of a glass. Reflecting on this circumstance, it occurred to me, that the roughness or tremulous motion we feel in drawing a hair through the fingers in the manner I have described, may be caused by minute vibrations, which are more easily excited in one direction than another, owing to some peculiar arrangement of the particles, or of the small filaments which compose the substance of wool or hair. Whether the tendency of the hair or fibre to move in one direction when pressed, arises from a peculiar vibration, or from inequalities of its surface, it is certain, that on this its felting quality depends.

This motion has been compared to that of an ear of barley placed under the sleeve of the coat, with the points of its beards downwards; by the action of the arm the ear is moved in a retrograde direction, until it has advanced from the wrist to the shoulder.

A farther illustration of this is given in an account of the process of hat-making. "When the straight hairs of the beaver, the rabbit, &c. are not intended to enter into the body of the mass, but are only to be employed in making a sort of external coating, such as is sometimes given to the outer surface of hats, the felt on which they are to be fixed being finished, the hair is uniformly spread upon the surface to which the coating is to be applied; and being covered with a cloth, it is pressed with the hands, and agitated for a certain time. By these means, the hairs introduce themselves by the root a certain depth into the felt, and are there fixed in such a manner as not to be easily extracted. If the agitation were continued for a longer time, these hairs would pass entirely through the felt, going out at the opposite surface, as each hair follows exactly the direction it acquired at the beginning."

If wool and hair be formed in the manner I have before stated, many peculiarities in their growth admit of an easy explanation. Wools are generally grown finer in the winter than the summer months. During winter, sheep have not the same copious supply of food as in summer; hence the wool-forming fluid will be diminished in quantity: the cold may also be supposed to contract the ducts near the surface of the skin. Some animals produce very coarse hair in summer, the bottom of which in winter will be a fine down or fur. Many of the secreting vessels in such animals, which unite in the last duct to form hair, may probably in the cold season cease to act altogether, and only such of them as secrete the very finest part of the fluid which forms down, may remain at that time in an active state.

Other animals inhabiting the polar regions, grow a long coarse hair, and distinct from this, a very fine short wool or down, close to the skin. The fine down seems intended to keep the animal warm, and the coarse hair to defend the down from the action of the elements, or from being worn away by the rocks and ice on which such animals repose. The fine down is secreted by smaller vessels, and probably from a finer part of the same fluid.

In these animals, the formation of hair and down may proceed at the same time, as they grow from distinct vessels. The South Sea seal produces a wool of this kind, which being buried under the coarse hair, was long neglected. It is now manufactured into cloth and shawls by Messrs. Fryers, of Rastrick, near Halifax. These shawls exceed in softness those of Persia or India.

Thus, from the tenants of the main, the inhabitants of frozen seas, has the ingenuity of man drawn materials to contribute to his wants and luxuries, more delicate than the productions of the celebrated Vale of Cashmire.

If the above account of the formation of wool and hair be admitted, the stoppage in the growth of wool which forms a jointed staple, and also the production of stiff or cotted fleeces, may be accounted for. When from disease, but more frequently from a deficiency of food and warmth, the animal ceases suddenly to secrete the wool-forming fluid, if this continue only for a short time, and by increase of warmth and food it again produces wool, a division in the staple will be seen, and by pulling it at each end, it will break where the stoppage in the growth took place.

Where the above causes operate for a longer time, the wool already formed having ceased to grow, and being deprived of a farther supply of yolk, is by the motion of the animal, and the action of wet, felted into a stiff cott. In some fleeces this takes place before the wool has separated from the skin: in others, the wool is nearly detached from the back, and connected only by a few scattered hairs where a languid formation of wool is going on. In some instances the formation of a new fleece has begun under that which is cotted. This takes place when the animal has again a better supply of food. The new fleece is connected with the cott by a few hairs in each staple which had never ceased to grow. Ewes which have had more than one lamb, and have been exposed to cold and wet, or scantily supplied with food, are most liable to have their fleeces cotted.

Immediately after shearing, wool is generally formed more rapidly and coarser than during any other period of its growth. That wool grows faster at this time is acknowledged; and hence M. Fink, in his account of the sheep of Saxony, explains why sheep produce a greater quantity of wool when they are shorn twice in the year, than when they are shorn only once in the same time. The increased growth of wool after shearing, I believe

arises from the pressure of the grown wool upon the secreting vessels being removed, whereby a sudden re-action and activity are given to them, and a greater quantity of the fluid is formed. The vessels may be also more expanded and stimulated, by exposure to the rays of the summer sun. Hence, the top of the staple which was grown immediately after shearing, will in most English wool be found coarser than the bottom part. I know it may be said, that the top of the staple is that portion of wool which was close to the skin at the time the animal was shorn, and was once the finest part of the wool. But this is not true, for the points of the staple are constantly wearing away and rubbing off; it is there the wet remains, and decays the wool. This is the true cause of the brown colour at the top of the staple, which some writers have thought it difficult to explain. A minute inspection will make the truth of this apparent, for it will invariably be found, that where the top of the staple remains discoloured after washing, a partial decay has taken place. This effect will be in a considerable degree prevented, by the first application of the ointment which I have recommended.

On examining a staple of English wool, we shall generally find, that the bottom part of it is rather finer than the upper, and the top part or point is coarser than the middle. The points were grown soon after shearing; the upper part, or rather more than half of the whole length, was grown during the summer and autumnal months; the bottom or finest part was produced after the commencement of winter, and from thence to the time of shearing. It may be objected to what I have before advanced, that if increase of food and warmth had a tendency to make wool coarser, the part of the staple which was nearest the skin at the time of shearing, being grown in May or June, should be as coarse as the middle part, which was grown in the autumnal months. We must however recollect, that in spring the fleece has nearly acquired its full size; and experience has informed us, that when the staple is near its usual length, the wool forming secretions are diminished, and its growth proceeds very slowly. If a fleece remain unshorn, and continue to grow two years, the quantity of wool produced in the second year is much less than what was grown the first. Any cause which diminishes the wool-forming secretions, or in other words, the quantity of wool grown in a certain time, has a tendency to

make it finer; and hence we may learn the cause of the wool being finer at the bottom of a full grown staple, than at the top. When the old fleece is removed, either by shearing or by falling off, new energy is given to the secreting vessels. I suspect also, that the exposure of the skin to the action of light and air, contributes something to this effect.

The direct rays of the sun in the tropical regions, appear to contract many of the pores whence the finer fibres of wool issue, and to enlarge others, thereby forming coarse hairs and kemps. I once examined the coat of a ram brought by a relation of mine from the banks of the Mississippi: it was a fine sound healthy animal, but it produced no fleece; it was thinly covered with short coarse hairs or kemps, under which there was a slight appearance of a fine down or wool: this might probably have been increased by proper management; nothing, I conceive, would have contributed more to this effect, than keeping the surface of the skin soft by rubbing it frequently with olive oil. The animal was given away soon after I saw it, and I had no opportunity of learning the effect which change of climate might produce.

It is doubtless ordered by a wise provision of the Author of Nature, that the same animals should be adapted to live in various climates, by the changes which different situations produce in their constitutions and habits. Hence we find that sheep, when removed between the tropics, and greatly neglected by man, will in a course of time divest themselves of their useless and cumbrous fleece, and be clothed in short coarse hair. By providing them with suitable shelter, and by great attention, wool might continue to be grown near the equator; but I believe its best qualities would be greatly injured, unless the flocks had the advantage of ranging on very elevated mountains.

In the more temperate climate of Buenos Ayres, wool is grown of the greatest length of staple I have ever seen; the hair was very coarse, and had been much neglected, as the fleeces were filled with the tops of a species of thistle peculiar to that country. Some of the staples measured twenty inches. There was also in these sheep a tendency to produce a very soft short wool covered by the coarser fleece. This short wool had nearly the appearance of the coarser kinds of the Vicuna wool. If we could suppose that the original breed of sheep

were the same with that which I have noticed from the banks of the Mississippi, we should have a striking instance of the effect of soil and climate upon the fleece, when removed from the fostering care of man. The effect of light and air on the furs of many animals, is well known, and it has been remarked, that men who work out of doors, with their heads uncovered, have hard, coarse hair. This may be caused by desiccation, or by the absorption of oxygen in a greater quantity through the pores of the skin. Every circumstance of this kind, if attended to, might lead us to remark the care which is requsite to cultivate the best qualities of the wool or fur, on the coats of those animals which are applied to the use of man. What improvements these may admit of, we cannot conjecture, as it is only upon sheep that experiments of this kind have yet been made. If we suppose that the goat, the cat, and the rabbit of Angora, were not originally distinct varieties of their species, it would be an object of much importance, as well as of considerable curiosity, to ascertain the circumstances of soil, of climate, and of treatment, which gave to these animals a long coat of such peculiar softness. It seems still uncertain, whether the shawls of Persia and of India, are fabricated from the produce of the goat or the sheep. An expedition to obtain some of these animals, would offer a richer prize to our manufacturers, than the acquisition of the golden fleece; for British industry would soon convert the wool into fabrics of more value than their weight of the purest gold.

The finest wools of Europe, cannot in the least compare in softness with the Asiatic fleece.

Mr. Luccock is entitled to praise for suggesting that the coats of many tame and domestic animals might, like that of the sheep, be applied to the service of the loom. The sneer of assumed sapience may be excited by this suggestion, accompanied with the exclamation, "What! shear wool from the backs of bulls and asses! Was ever any idea so preposterous! Let us, however, bear in mind, that the horizon of ignorance is as contracted as the narrow bounds of its own limited experience; every thing beyond this is considered as absurd or impossible. Had these sapient sneerers lived in a period prior to the application of the labours of the silk-worm to the luxury or the convenience of man, with what contempt would they have treated

the observer of Nature, who having remarked some of the properties of silk, and anticipated its use, had hence ventured to predict, that in some future age, the imperial purple, the royal mantle which was to invest the shoulders of the mightiest potentates, would be fabricated from the cobweb of a grub. There is indeed no instance in the history of human industry, which would at the first sight appear more surprising than the application of this substance to the service of man. Instead of allowing ourselves to believe that what has been already done by ingenuity and perseverance is all that can be accomplished, we should rather contemplate the experience of former times, as affording us imperfect hints, which, if properly attended to, may lead to future improvements, and to discoveries of still greater importance.

Amongst the animals which seem suited to our climate, I would recommend an attention to the varieties of the Pacos and Vicuna. Some of these are nearly white, and I have little doubt, would, with proper attention, grow a fleece free from the long coarse hair with which its downy coat is frequently intermixed. The wool when clear from these hairs, would be worth thirty shillings per pound; and the flesh, if we may judge from the appearance of the animal, should be equal to venison.

A grazier in Leicestershire, who is also a dealer in wool, has observed that some of the Scotch cattle have upon their backs, what he called "soft woolly tufts of hair;" and he further noticed, that the cattle which had these tufts throve better than others, and he always gave them the preface when purchasing his stock. If such varieties were attended to, and promoted, probably we might obtain from them a valuable addition to the materials on which national industry might be profitably employed. Nor can this be thought improbable, if we recollect, that a breed of oxen is said to exist in Hudson's Bay, which produces a wool finer and softer than that of the Vicuna. We know already that the coat of the latter animal, and of the goat, the rabbit, and of the amphibious seal, have been spun and wove into cloths and shawls, some of which were of greater value than any ever produced from the wool of European sheep.

In a former chapter, I have noticed the effect of increase of food on the qualities of wool. If the Spanish sheep resist this

effect longer than the English, it may arise from the peculiarity of its constitution, whereby the increase of nourishment is applied more to fattening the animal, and the production of yolk, than to the secretion of the wool-forming fluid; or its pores may more firmly resist dilatation from the impetus of increased secretion; the staple of the wool may thus be grown longer, but the hair may continue equally fine. The effect of heat, light, and air, in increasing the secretions, and dilating the excretory ducts, and thus forming coarse kemps, might be explained in the same manner; and also many other peculiarities attending the growth of hair and wool; but I have already extended this article beyond my original design.

Before I conclude, it will, however, be proper to reply to an objection which may be made, against what has been here advanced respecting the structure and formation of hair and wool. I have stated their substance to be similar to that of feathers. In the latter, there is evidently a circulation and secretion carried on until the feathers have obtained their full size. This objection will be removed by an attention to the difference in the structure and growth of each. Hair or wool, when first protruded through the skin, is perfectly formed, and each part of it is of the same size which it ever after retains. But it would be impossible for any portion of the feather to be formed full grown and perfect within the skin. A tube or stem first appears, from which the other parts afterwards shoot forth, and are supported and increased by circulating fluids from the parent bird. When the extremities of the feather are fully formed, they become indurated, the smaller vessels close up, and the circulating fluids recede lower and lower down, until they are at length denied all farther entrance into the quill.

Such I apprehend to be the process of Nature, and that this entire cessation of the accustomed secretions occasions the disease which we call the moult. This is probably a species of fever. The bird loses its cheerfulness and relish for food, and is seized with sudden shiverings. The disease continues until the old feathers fall off, when the secretions are again renewed, by which the bird is restored to health, and acquires a renovated plumage.

Hair is as fully and perfectly formed after it leaves the skin as the extremity of the feather in its most mature state; it ap-

pears to grow merely by the addition of new hair at the bottom, which protrudes it forward. On the contrary, feathers, and all bodies which grow and increase from interior circulation, not only grow from the upper part, but continue to enlarge in every dimension until they are full grown. The difference between the growth from the top and sides of the feather, and the elongation by mere juxta position at the bottom of the hair, appears to me clearly to indicate the different modes of their formation. It may tend to confirm the opinion I have advanced respecting the structure of hair and wool, that hair is frequently observed to split at its points into different fibres; a division has also sometimes been seen in the hair of wool. This seems to prove that they are formed by a number of distinct long filaments uniting in one thread or hair, as I have described. It is not, however, on hypothetical reasoning that I rest the proof of this opinion. I have ascertained its truth in some instances, by an examination of the hair of different animals, both with the single and compound microscope. In large hairs I have discerned a number of divisions from the root to the point. In one hair I distinctly perceived fifteen of these divisions or fibres laying parallel to each other, and in some of the fibres a further subdivision was distinguishable. Probably these subdivisions were each composed of others still smaller, which the limited power of our instruments may prevent us from discovering. If such be the structure of the hair of some animals, it is at least probable the hair of all others may have a similar conformation; although the fibres of which they are composed may be too minute, or adhere too firmly together, to admit us to separate or distinguish them. It were almost needless to add, that wool, whatever may be its peculiar qualities, is still the hair of sheep, and must be formed by a process of the animal economy similar to what produces the hair of all other quadrupeds. I might offer as a farther confirmation of what has been here advanced, that it may be fairly inferred from wool and hair remaining long after they are separated from the skin without any perceptible change, that they have not been deprived of any secretions from the circulating fluids by this separation.

Whether wool be composed of tubes and vessels receiving increase by constant circulation and secretion of fluids from the animal, or whether, like the silk-worm's web, it be a solid un-

organized thread, composed of finer filaments, may appear a question more curious than important. But if the latter opinion be well founded, which both deductions from analogy and the minutest microscopical researches render probable, it will lead to consequences of considerable practical utility, and teach us to bestow more care and attention on the unshorn fleece. Nature, when she produces wool, provides for it, and covers it with an oily secretion, or yolk, and thus intimates that she has confided its future defence and preservation to external applications. When, from accidental circumstances of situation, this yolk is absorbed, or its copious secretion is prevented, she has given us the power of supplying the deficiency, of assisting her intentions, and improving her operations, by the application of ointments better suited to resist the effects of soil and climate. Thus by attending to the intimations of Nature, man is enabled in northern latitudes to cultivate and bring to perfection, both the animal and vegetable productions of southern and more favoured regions.

ON THE USE AND CULTURE OF SEA KALE.

[For the Massachusetts Society for Promoting Agriculture.]

Roxbury, November 20th, 1814.

GENTLEMEN,

PRESUMING that any improvements in horticulture tending to increase the number or improve the quality of our culinary vegetables, are embraced within the objects of our Society, I take the liberty to introduce to the notice of the public, through your journals, a very valuable vegetable which has of late years been extensively cultivated in Great Britain, and much esteemed as an addition to the list of esculent vegetables.

The sea kale, which belongs to the cabbage tribe, has been long known in Devonshire and other parts of Great Britain bordering on the sea, where it grows wild in a light sandy soil. The inhabitants of these counties where it is indigenous have long used it as a culinary vegetable, but its general introduction is much more recent. It was unknown to Mr. Philip Miller, that

most indefatigable and intelligent gardener, when he published the quarto edition of his Gardener's Dictionary in 1771.

At present it is one of the most favorite articles of cultivation for the table.

It is the most tender and delicious of all the numerous species of the brassica or cabbage, not excepting even the cauliflower. It does not like most cabbages form a head, and it would be both coarse and tough if it were not bleached. It is a very early plant, ready for the table without being forced about a fortnight before you can cut asparagus.

It has one advantage over all other vegetables, except the asparagus, and that is its being a perennial plant, and of course requiring but little trouble.

Various essays have been written in England on its culture, but I thought it would be more useful to state what had been its mode of culture and success in our own country, especially as there are important differences arising from the difference of climate. For example, in England it is necessary to sow it in the fall, as it will not come up the first season. In this country it will grow as readily the first season as any other plant.

The soil ought to be rather light and dry. In deep, rich and moist land it is very apt to rot.

The seed should be sown in rows about three feet apart, and the stools or plants in each row should be also three feet asunder. Three seeds should be sown in a place, two of which may be removed after they have taken, and the most vigorous plant left.

In the first and every succeeding fall the dead leaves should be carefully removed lest they should rot the crowns of the plants, as they are very large and succulent.

The crowns are generally about one or two inches above the ground. In our climate the crowns should be covered in November with sea-weed, litter, tan, or if neither of these are at hand, the earth should be heaped around them.

In the spring, as soon as the frost is out of the ground, the earth should be dug around the plants, taking care not to wound or injure them. The crowns of the plants should then be uncovered and a pot, or wooden box, or a little fresh tan, or which is said to be preferable to either, some sea sand should be heaped over them to the height of one foot.

I have always used an earthan pot, and it is the most cleanly and simple plan, but would not so well suit those who should raise them for the market, as the expense would be too great. The common soil where it is dry will answer, but if the season should be wet the young shoots will be apt to rot.

About the middle of April, sometimes sooner, you may open the earth or remove the pots to examine the state of the plant.

If it is sufficiently grown you can cut it. One head will furnish enough for a dish. In cutting it you must be careful not to wound the crowns. It may be cut down to within an half inch of the old crown of the last year. It should be cut but once in a season.

The shoots are of a most brilliant white, and the tops of them a beautiful violet, and they form, if thoroughly boiled, a vegetable certainly equal to the finest cauliflowers.

As its principal excellence next to its perennial duration is its preceding all other fresh vegetables in the spring, it would be advisable to give it the warmest and earliest situation in our gardens.

The curious and luxurious may have it at a still earlier period, by surrounding it in February with fresh horse dung at the rate of a wheel-barrow to a plant. This will be no loss, as the manure will be then on the ground ready to be employed in other neighbouring parts of the garden.

It has been considered in England where their list of vegetables for the table far exceeds ours, and where they much excel us in horticulture, as the most valuable accession made within a half century to their kitchen gardens.

My own experience has satisfied me, that it is entitled to the same attention with us, and it is perhaps of more consequence here, since it requires less attention and care than most plants, not demanding yearly removal, and in a climate so backward in the spring it is of great importance to cultivate those plants, which have so early a growth. Any further information which may be required by any cultivators I shall be happy to give when requested.

Your humble servant,

JOHN LOWELL.

N. B. I have cultivated this plant successfully for five years past. It ought not to be cut till the second year after it is sown.

NOTICE FROM A WORK OF MONSIEUR LELIEUR ON THE HEREDITARY DISEASES OF FRUIT TREES.

BY SIR JOSEPH BANKS.

[From Tilloch's Philosophical Magazine.]

M. Lelieur, a French gentleman who holds the rank of administrator of the parks and gardens of the crown, has lately published a book on the diseases of fruit trees.

In this he asserts that the disease called in French *le blanc* or *le meunier*, which shows itself by a mealy whiteness on the leaves of the peach tree or on the fruit itself in blotches, that destroy the flavour, is an hereditary disease; that plants raised from the kernels of trees subject to this disease, will produce plants in like manner infected, and will communicate the disease to grafts, taken from sound trees, inserted in them; and that grafts from diseased trees will certainly be diseased, although taken from branches that are quite free from the appearance of disease.

He attributes the same hereditary continuance to the *gum*, a disease more mischievous possibly than any other, to our grafted and budded stone fruits: and he is of opinion that this disease also may be entirely avoided, by grafting from trees that never have been subject to its attacks.

The importance of these facts to the interests of horticulture, will, it is hoped, justify the writer for offering this short account of them to the Society, though they are taken from the Moniteur of the 7th December, 1811, the book not having been yet brought into this country.

The *mealy disease*, he says, is certainly not contagious, and he instances a fruit wall at *Versailles* on which are many curious *peach trees*, some of which are much damaged by it while others are entirely free from it.*

* Judge Peters in a communication to the Philadelphia Agricultural Society, says, "When trees become sickly, I grub them up; I find that sickly trees often infect those in vigour near them, by some morbid effluvia."

ON THE CULTIVATION OF THE FULLER'S TEASEL.

[*Dipsacus Fullonum.*]

[Miller's Gardener's Dictionary. Willich's Domestic Encyclopœdia.]

THE teasel is an article of considerable importance to clothiers, who employ the crooked awns of the heads, for raising the nap on woolen cloths. For this purpose they are fixed round the periphery of a large broad wheel; against which the cloth is held, while the machine is turned.

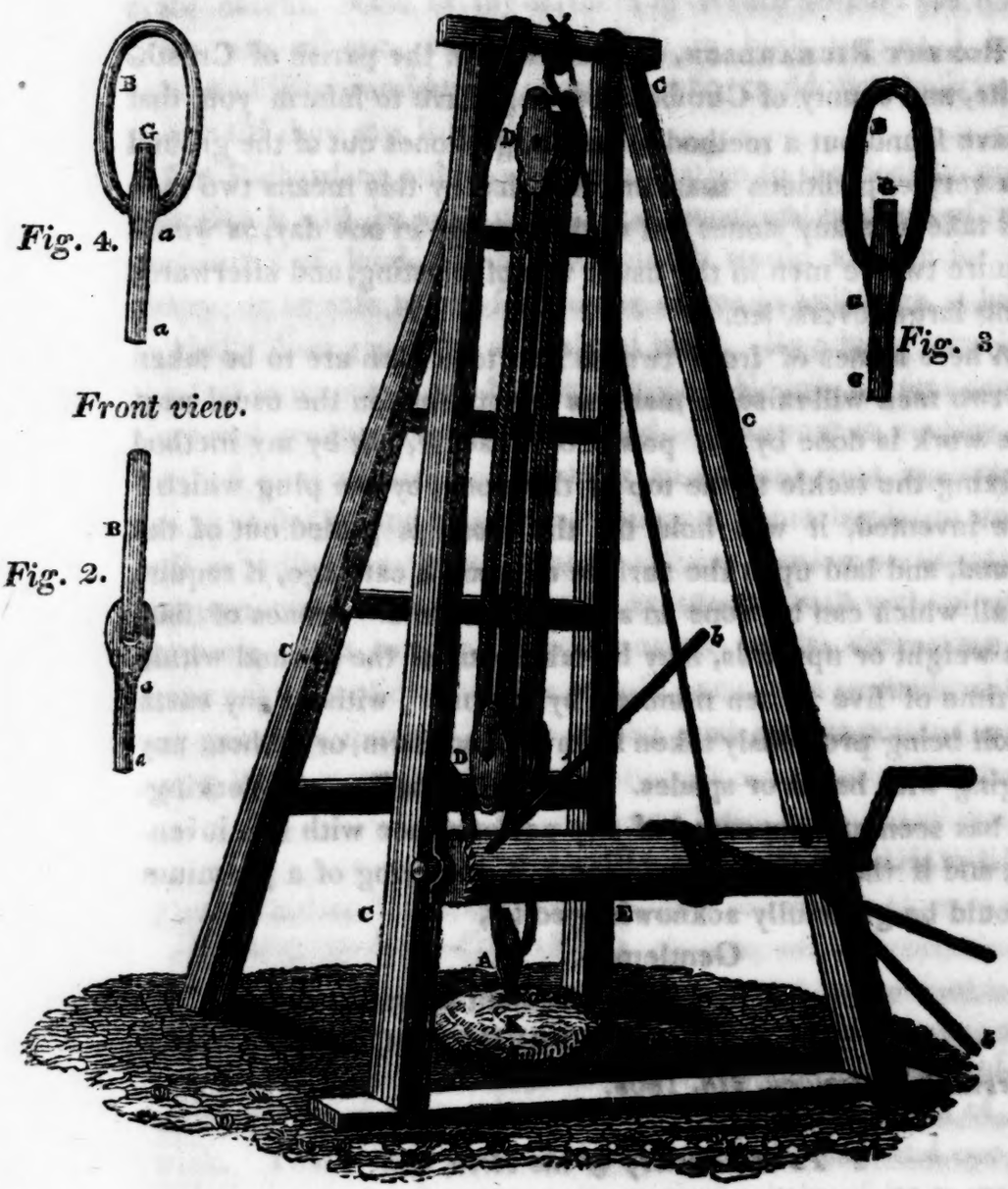
It is raised from seed, scattered on ridges seven or ten inches apart in the proportion of from one to two pecks per acre. The proper season for sowing is the month of April. The soil ought to be strong, rich clay, or what agriculturalists term, a *good wheat land;* when the plants are up, they must be hoed and well weeded, and the plants thinned out to let them stand a foot asunder. The first appearance of teasel is much like that of lettuce. The second year the plants will shoot up stalks with heads, which will be fit to cut in August—when ripe they turn brown. The stalk is a foot long. When cut, they are to be tied in bunches and set in the sun, or dried in the house. The common produce is about one hundred and sixty bundles or staves, of twenty-five stalks, to the acre. The heads should be pulled before they are quite ripe.

Note.—The gentleman who suggested the subject of teasel as worthy of our attention, and who is a member of the Board of Trustees, cultivated the teasel the last season on his farm in Roxbury and sold his crop at so great a profit that he could not but wish this important article should be more generally known and more extensively cultivated than it now is.

MR. RICHARDSON's

Method of raising large Stones out of the Earth.

Edge view. *Fig. 1.* *Perspective view.*



METHOD OF RAISING LARGE STONES OUT OF THE EARTH.

BY MR. ROBERT RICHARDSON, *of Keswick, in Cumberland.*

[From Tilloch's Philosophical Magazine.]

GENTLEMEN,

I, ROBERT RICHARDSON, of Keswick, in the parish of Crosthwaite, and county of Cumberland, beg leave to inform you, that I have found out a method to take large stones out of the ground in a very expeditious manner, and that by this means two men will take as many stones out of the ground in one day, as would require twelve men in the usual way of blasting, and afterwards using large levers, &c.

Where stones of from two to four tons each are to be taken up, two men will raise as many as twenty men in the usual way. The work is done by the power of a tackle, but by my method of fixing the tackle to the top of the stone, by the plug which I have invented, it will hold till the stone is pulled out of the ground, and laid upon the surface or upon a carriage, if required, all which can be done in a very little time. Stones of four tons weight or upwards, may be taken out of the ground within the time of five or ten minutes, by two men, without any earth or soil being previously taken from around them, or without any digging with hacks or spades. J. C. Curwen, Esq. of Workington, has seen and approved of my performance with this invention, and if the Society should think it deserving of a premium it would be gratefully acknowledged by,

Gentlemen,

Your obedient servant,

ROBERT RICHARDSON.

Keswick, February, 8th, 1808.

To the Society of the Arts, &c.

DEAR SIR,

I cannot suffer Mr. Richardson's letter to be sent to the Society without adding a few lines concerning it. I can bear ample testimony to the case with which the largest self-stones are lifted

by his method. I have seen one upwards of five tons lifted by four men. One of the plugs is sent for the inspection of the Society. There is no difficulty in cutting the hole to recieve it, the only care is not to make it too large. It is difficult to explain the theory of its action; the least stroke laterally disengages the stone. In many situations it is likely to be of great use, not only in drawing stones out of the ground, but in making embankments, where the stones are only to be lifted a moderate height. One of my farmers in Westmoreland has made great use of one, and speaks of it in high terms; I have exhibited it to numbers of persons, who could not believe its power till they saw it tried.

Mr. Richardson submits its examination to the Society, and I conceive it will be very useful and beneficial in cases of new enclosures of land. I do not think it would answer for soft stones, or be safe to use for raising stones in buildings, it being so easily disengaged by any lateral blow. By adding wheels to the tackle machine, or having it upon a sledge, a great deal of time and trouble would be avoided. I purpose to employ this method next summer in making an embankment against the sea; the facility it will give in raising and removing large stones, will expedite the work greatly. If any further certificates of the performance of this plug be required, I will with pleasure transmit them to you. I will answer for its extracting any stone not exceeding five tons weight out of the ground, without any previous moving of the earth; and it is important to preserve large stones entire.

I am, &c.

J. C. CURWEN.

To C. Taylor, M. D. Secretary,
Workington-Hall, Feb. 1808.

SIR,

I am favoured with your letter desiring my opinion of the utility of the iron plug invented by Robert Richardson, of Keswick. That which I use is about six inches long, and one inch and a quarter in diameter; it requires a hole of its own size, only two inches deep; the plug is to be driven in a little short of the bottom, and will raise a stone of six or eight tons, with the assistance of three men, in the course of ten minutes after

the hole is prepared; and I do not hesitate to say that three men, thus furnished, will clear the ground of large stones in less time and more effectually, than twelve men by any other method yet come to my knowledge. The plug should be made of good beaten iron. The simplicity and cheapness of the whole apparatus is a great object, as a good plug of the size I use will only cost two shillings and six pence. I am fully of opinion, that by adding more and stronger ropes and pulleys, work might be done by it to an amazing extent. I have reaped great advantage in my farm from the aid of the iron plug, and in justice to the inventor, am happy in vouching for its extreme usefulness, several of my respectable neighbours have experienced the aid and benefit of the above instrument, and will vouch, if required, for the truth of the above statement.

I am, &c.

ROBERT WRIGHT.

Rose Gill Hall, Westmoreland, May, 1808.
To C. Taylor, M. D. Secretary.

Reference to the Engraving of Mr. Richardson's Invention for Raising large Stones out of the Earth. See plate, figures 1, 2, 3, and 4.

Fig. 1, K. shows the upper part of a stone nearly buried in the earth, having a hole made in it three inches and a half deep, and one inch in diameter, by means of a miner's jumper; the cylindrical tail of the plug *a*, fig. 2, 3, and 4, which is of the same size, is driven fast into it, by means of a hammer applied upon the head of the plug G. This plug in its whole length, is nine inches, and has a hole made in its broad part H, through which the oval iron ring, B, passes easily, and on which the plug can move backwards and forwards, when the ring is hung upon the hook of the lower pulley block of the lifting tackle. C C C C represent the four legs of frame-work of the quadrangle; D, a five-fold tackle, with blocks ten inches in diameter; E, a roller seven inches in diameter, turned by two long iron levers, b b; the handle, I, is used as a safeguard, and to assist to regulate the power of the levers. In figure 1, the plug A is shown fix-

ed in the stone K, ready to draw it out of the ground, by means of the lifting tackle.

N. B. The hinder legs of the quadrangle are made to close in between the fore legs, for the convenience of carriage.

OBSERVATIONS ON THE REMARKABLE DECAY OF PEACH TREES, OF LATE YEARS.

BY R. PETERS, ESQ.

[From the Philadelphia Agricultural Society's Publications.]

THE last meeting of the Society was favoured with a communication on the subject of *Peach Trees*, from Joseph Cooper, Esq. of New-Jersey, whose experience has enabled him to add much to our stock of practical knowledge. I was desired to give some account of what had fallen under my own observation, relating to this valuable and delicious fruit. I know not any in the catalogue of our trees, more desirable, nor more subject to mortifying decay, disease and destruction. Having cultivated it from my earliest youth, it should seem that I could give some certain and profitable mode of remedying its tendency to premature decay, and repelling the diseases to which it is invariably a victim. But I have found myself so frequently baffled in my endeavours; and have seen the fallacy of so many theories on this subject, that I diffidently affirm any thing respecting its culture or cure. It is therefore only in obedience to the wishes of the Society, that I express my opinions or experience.

About fifty years ago, on the farm on which I now reside, my father had a large peach orchard, which yielded abundantly. Until a general catastrophe befel it, plentiful crops had been for many years produced, with little attention. The trees began nearly at once to sicken, and finally perished. Whether by the wasp then undiscovered, or by some change in our climate, I know not. For forty years past, I have observed the peach trees in my neighbourhood, to be short lived. Farther south, in the western country, and, it seems, in some part of New-

Jersey, they are durable and productive, as they had been formerly here.*

In my youth, excellent plums grew here; now we can obtain none, but those of inferior species. In grapes we were never successful; though much more so than at present. Our wheat in modern times, is attacked by enemies unknown to our predecessors. Our apple orchards do not produce, as they did in early times. There must therefore be some change in our climate; and new races of vermin, not known to our ancestors. In cities and towns, grapes and plums, and I believe peaches, are in high perfection. The atmosphere in which they vegetate, possesses a character favourable to their growth; and their position admits fewer enemies to assail them. I am aware that it is a frequent mistake, to draw general conclusions, from partial facts. My opinions are formed on experience I have gained on my own property, and may not generally apply. I have near one thousand apple trees, one hundred and fifty grape vines, two hundred peach trees, and a number of plums. They are of all ages, kinds and exposures; and set out in every variety of soil. I have endeavoured to practise on every information to be acquired from books, or oral directions. I must therefore conclude from my frequent disappointments, that fruits in this part of the country, are uncertain in product; and have declined in quantity and quality, in a degree not formerly experienced. I have often observed, that in bad fruit years, the seasons were unhealthy for animals. *Insects* and their *larvæ*, or caterpillars, and other enemies to fruit, abound in such seasons. The products of the earth seem to be more favoured at one period, and in different stages of the settlement of our country, than at others. Advantages or misfortunes, merely local, have their influence. Some are perfected in old settlements; others thrive only when the earth is recently reclaimed from the wilderness of nature.

Of the peach, I have thirty-two varieties. Mr. Coxe, of Burlington, has double that number. But those I have are sufficient to enable me to form a general idea. I find some less exposed

* I have seen them also in great perfection, in and about Lancaster, and other parts, where limestone and other calcarious substances abound. The cause I do not pretend to assign; nor do I know the general duration of the tree, in that country.

than others, to misfortune and decay. It would therefore be desirable, to mark, and cultivate those most commonly, in which the most success could be counted on. Mr. Cooper has been successful, on this plan, in other products. Let him, and other curious cultivators, practise on this suggestion.

I have failed in many things, in which others are said to have succeeded. Straw and bass, or paper, surrounding the tree, from the root, at all distances, from six inches to three or four feet; white washing, painting, urinous applications, brine, soot, lime, frames filled with sand, oil, tar, turpentine, sulphuric acid or oil of vitriol, nitrous mixtures, and almost every kind of coating. I ruined several trees, by cutting them down, and permitting the stump to throw up new shoots, and branch at pleasure. All teguments kept the exsudation from evaporating with freedom. The pores being closed, or too open, were alike injurious. Teguments of straw or bass made the bark tender; and it threw out under the covering, sickly shoots. The more dense coating stopped the perspiration. The oil invited mice and other vermin, who ate the bark thus prepared for their repast and killed the tree. I planted in hedge rows and near woods, I paved, raised hillocks of stone—I have suffered them to grow from the stone only, grafted on various stocks and budded, hilled up the earth in the spring and exposed the butt in the fall, sometimes I have used the knife freely—frequently have left the tree to shoot in every direction—I have scrubbed the stocks or trunks, with hard brushes, soap suds and sand, scraped them with proper instruments: I have, for a season or two, under various experiments, amused myself with the persuasion, that I had discovered an infallible *panacea*. I had temporary success, but final disappointment.

The *aphis* or vine fretter, and many other insects are hostile to this tree. They injure it, by piercing, curling, and destroying its leaves. As to *frosts*, they are common enemies to all fruit.

Having thus candidly given an account of my failures, which never discourage, but animate me to new projects, I mention what with me has been attended with the most success.

The worm or grub, produced by the wasp, depositing its progeny in the soft bark, near the surface of the ground, is the most common destroyer. I remove the earth, a few inches round the tree in August or September. After July the wasp

ceases to pierce the bark, and to make its deposits. I pour around the butt of the tree, beginning about one foot above the ground, a quart or more (not being nice about the quantity) of boiling hot soap suds or water. This kills the egg or worm lodged in the tender bark; and of course prevents its ravages the next season. I carefully search the trees, though I seldom find worms. I do not perceive any injury from this operation. I have discovered worms in or near the roots of the smallest stocks taken from the nursery. These I frequently plunge into boiling water, before planting. I lose very few; and do not attribute the losses to the hot water. I have the trees bared at the roots, exposed to the winter. I have lost some in the way described by Mr. Cooper; but I still continue the practice. I have been in the habit of doing this for ten or twelve years, and prefer it to any other treatment. To supply deficiences, I plant young trees every year. By these means, I have generally fruit enough for my family, and frequently very abundant crops. How long I shall continue to prosper by this practice, is yet problematical. I have now some of the most healthy trees I ever possessed. When trees become sickly, I grub them up; I find that sickly trees often infect those in vigour near them by some morbid effluvia. The young trees supply their loss, and I have no trouble in nursing those in a state of decay, which is commonly a hopeless task.

I have been thus particular, to justify the inference from this statement—that, in this part of the country peach trees cannot be profitably cultivated on an extensive scale. But we may have great abundance of their delicious fruit, in every variety, if every farmer and horticulturist, would plant the number, to which he could attend, without interference with his other concerns. He might keep up a constant succession, by setting out a few every year. Our grain, and garden plants in general, require renewal annually; and peach trees require no more trouble. A tree with very little attention, will produce three or four crops. Its growth is quick; and it may be propagated easily, and come to perfection, in any soil of tolerable staple. As the older trees decay, or grow sickly, young and vigorous trees will begin to bear. The method which I have lately pursued is simple; guards against the worm, and affords me a plenty of fruit. I do not mean to discourage perseverance in

experiments, which may yet succeed. We must never part with hope; though she seduces and "cheats us o'er and o'er again." The ants of Grenada were exterminated by a single tempest.

Although I have had trees twenty years old, and I know some of double that age, (owing probably to the induration of the bark rendering it impervious to the wasp, and the strength acquired when they had survived early misfortunes,) yet, in general they do not live in tolerable health after bearing four or five crops. And being among the most gummy, viscous, succulent and tender of our fruit trees, they require from the earliest stages of their growth more labour and attention, than could be profitably applied to an extensive plantation. I have too many to be sufficiently attended to; but a number of them, by their present appearance, warn me not to be uneasy on that score. The shoots of the last season were remarkably injured by the excessive drought; and the extremities of many limbs are entirely dead. I shall have, however, more than I require for myself, my friends, and my foes. I have a superfluity, to afford deductions made by plunderers; for whom, from necessity, I plant an extra number. The trees now verging to their last stage, are chiefly those set out in the locust year. They have never recovered the wounds, inflicted by this most pernicious of all insects.

Fifteen or sixteen years ago, I lost one hundred and fifty peach trees in full bearing in the course of two summers; by a disease engendered in the first season. I attribute its origin, to some morbid affection in the air, which has the most to do with all vegetation, as well in its food and sustenance, as in its decay and dissolution. The disorder being generally prevalent, would, among animals have been called an epidemic. From perfect verdure, the leaves turned yellow in a few days, and the bodies blackened in spots. Those distant from the point of original infection, gradually caught the disease. I procured young trees from a distance, in high health, and planted them among those the least diseased. In a few weeks they became sickly, and never recovered. I took the determination of grubbing up every peach tree, and converted them into fuel. In my own nursery, perceived I should have a hospital of incurables. The young peach trees being generally infected, I cleared the whole of them away Various kinds of fruit trees, in the same nursery, were

not in the least disordered. Trees, like animals, have inherent diseases, or a susceptibility to receive those, peculiar to their species. The peach seems most subject to this tendency; pears are liable to blights from the electric fluid. Iron hoops, old horse shoes, &c. hung on these trees, attract and conduct for a time, this floating fluid. But when the air is surcharged, destruction partial or total is certain. Cherries are fatally operated upon, by what is called the four o'clock sun. Plums too are exposed to peculiar disasters, which would lead me too far to detail; though I have paid much and unprofitable attention to them; and have, now and then, hit on temporary palliatives. Particular insects and vermin have their respectively favorite tree, or plant to prey on. They pursue the dictates of nature, for their own propagation and support; while, by destroying our sustenance and comforts, they become hostile to us. They compel us to wage against them a perpetual warfare.

After my general defeat and most complete overthrow, in which the worm had no agency, I recruited my peaches from distant nurseries; not venturing to take any out of those in my vicinity. I have since experienced a few instances of this malady; and have promptly, on the first symptoms appearing, removed the subjects of it, deeming their cases desperate in themselves, and tending to the otherwise inevitable destruction of others.

QUERIES ADDRESSED TO FARMERS.

[With a view to collect the most accurate information on the principal branches of agriculture, as now practised, the following queries are addressed to intelligent farmers and to Societies instituted for the promotion of agriculture. The answers subjoined are those of the NEWBURY AGRICULTURAL SOCIETY and the AGRICULTURAL SOCIETY IN VASSALBOROUGH.]

I. OF what quantity of land do the Farms in your vicinity generally consist?

Newbury. Seventy-five acres is an average farm.

Vassalborough. One hundred acres.

II. What is the quality of the Soil?

Newbury. Sand, loam, and clay: the loam is considered the best.

Vassalborough. We have almost every variety of soil, from the shallow mould on the ledge, to the bog that is apparently bottomless. There are large swells of moist land of a rich loam, interspersed with large stones; less swells of slatey land of a gravelly loam; a considerable proportion of clayey soil, free from stones; and some, which at certain seasons of the year is covered with water.

III. Into what portions of Pasture, Mowing and Tillage, Orcharding and Wood, are Farms usually divided? Are the Orchards improving or declining? Do they yield a competent supply of Cider?

Newbury. One seventh Orcharding and Woodland; and of the remainder, two fifths Mowing and Tillage, three fifths Pasture.

Vassalborough. About one fourth of an average farm is covered with the original growth; and about the same proportion is growing to young wood. They have about twenty acres of Pasture, twenty of Mowing, six of Tillage, and two of Orcharding. Orchards are improving; and afford Cider more than sufficient for the inhabitants.

IV. How much land on each Farm, is annually, (on an average of years,) planted or sown with Grain of any kind?

Newbury. About one thirteenth.

Vassalborough. They average about five acres of Corn and Grain on tilled land.

V. In what manner is the land prepared, manured, and seeded with each kind of Grain, and what is a medium Crop?

Newbury. We plough twice. For planting, we manure our land from ten to thirty loads per acre. We sow two bushels of wheat, three of barley, one of rye to the acre. An average crop of corn is forty bushels, of potatoes two hundred, barley thirty, rye fifteen, wheat sixteen to twenty bushels per acre.

Vassalborough. A crop of corn or potatoes having been taken off, the ground is then ploughed in the fall, again in the spring, harrowed, and sowed with wheat or oats, rarely with rye, and still more rarely with barley. Rye is sometimes sowed on sward land in the fall, and sometimes with oats in the spring.

VI. In what manner is Indian Corn cultivated, and what is the medium Crop on an Acre?

Newbury. We plough universally twice, and manure with from ten to thirty loads of manure.

Vassalborough. New, or sward land is broken in the fall or spring, and planted; when the corn is up, Gypsum is applied; (sometimes the corn is wet and mixed with Gypsum before planting,) it is usually hoed twice, but good crops are frequently raised with once hoeing. This crop being gathered, the land is ploughed in the fall, and manure put on in heaps. In the spring, again ploughed, then planted; a great proportion of the manure being put in the hills. It is hoed once or twice, very rarely three times. An average crop, when well tended, is from thirty to forty bushels per acre.

VII. What is the quantity and value of the Straw on an Acre of Barley, Rye, Oats and Wheat *respectively?* And to how much Upland Hay are they *respectively* equivalent for Fodder?

Newbury. About fifteen hundred weight of barley straw: its value is thought equivalent to half its weight of upland hay. The straw of other grain we consider of little value except for litter.

Vassalborough. Straw except oat, is seldom used for fodder. Oat straw is about one ton to the acre; equal to half its weight in good upland hay. Some mix rye and wheat straw with butts of corn, which answer a good purpose.

VIII. What is the value of Straw of each kind, for any purpose, *other than Fodder or Litter?*

Newbury. It is worth one and half load of manure; at fifty bushels per load. We consider it best for potatoes ploughed in when rotten in part.

Vassalborough. No use is made except for fodder or litter.

IX. What is the value of the Stover or Stalks on an Acre of Indian Corn, and to what quantity of Upland Hay is it equivalent for Fodder?

Newbury. Is worth twelve hundred of English or herds-grass hay.

Vassalborough. When mixed with, the fodder from an acre of corn is equal to half a ton of upland hay.

X. What quantity of land, on a medium Farm, is annually planted with Potatoes?—How is the land prepared? What quantity and kind of manure is applied to an Acre, and in what Manner? How much seed is used, and how is it selected? How are they cultivated, and what is a medium Crop?

Newbury. From one to two acres ; prepared similar to Indian corn ; manured with the coarse manure ; seed from ten to fifteen bushels ; cultivated similar to Indian corn ; crop two hundred bushels.

Vassalborough. One acre. The roughest ground, capable of tillage is generally selected ; ploughed and harrowed once. The manure, when used, (which is rarely the case,) is commonly put in the hills. From twelve to fifteen bushels of seed are commonly put to the acre, of such potatoes as happen to be on hand ; generally hoed once, and an average crop is about two hundred bushels to the acre.

N. B. It has been customary to plant the small ones whole and cut the large ones ; but from several experiments made the last season, it appears that the better method is to select the largest of the kind intended to be propagated, and to plant them whole. It also appears from some experiments, suggested the last season, by the scarcity of seed, that a much less quantity will answer than is usually applied. In one instance, five bushels only were planted on an acre, and more than two hundred bushels were the product. In another, more than fifty bushels were raised from three pecks of seed.

XI. How many bushels of Potatoes are equivalent, ordinarily, to one bushel of Indian Corn, for Sale ?

Newbury. From three to four.

Vassalborough. Three.

XII. How many days labour of a man, are usually employed on an Acre of Indian Corn, including the getting in all the Stover and stripping the Husks from the Ears ?

Newbury. From twenty to twenty-five.

Vassalborough. Fifteen.

XIII. What is the labour of Shelling a hundred bushels of Indian Corn, and in what manner is it performed ?

Newbury. About seven days labour, performed by placing a spit across a box or tub and scraping the ear against the spit.

Vassalborough. When thrashed or pounded out in a barrel provided for that purpose, it requires about four days ; but when shelled by hand, or with an Iron as the practice of many is, about ten days.

XIV. How many days labour of a man are usually employed on an Acre of Potatoes, including the getting in the Crop ?

Newbury. The labour is about the same as that of Indian corn.

Vassalborough. Twenty-five.

XV. Is there any order or succession of Crops known to be beneficial or pernicious to the Soil?—If any, what is it?

Newbury. Flax we consider hurtful to the soil.

Vassalborough. We have made no experiments to determine.

XVI. What is the usual course of Crops?

Newbury. Planted two years with Indian corn, or potatoes; the third sowed with grain and grass seed; lay down to grass from three to seven years.

Vassalborough. Corn, wheat, grass.

XVII. What is the medium quantity of Hay produced on an Acre of Upland, and what is the labour of mowing, curing and housing it?

Newbury. Twenty-five hundred. About three days labour.

Vassalborough. One ton. Three days labour.

XVIII. What is the medium product of Hay, on an Acre of fresh Meadow; and what is the labour of mowing, curing, and housing, or stacking it?

Newbury. About one ton—the labour from two to three days.

Vassalborough. One ton, and three days.

XIX. What is the proportion of value which fresh Meadow Hay bears to Upland Hay, each being of a medium quality?

Newbury. About two fifths.

Vassalborough. Meadow hay is worth about half its weight of Upland hay.

XX. Is any Tillage land laid down with Grass Seeds, without sowing Grain at the same time? If so, which method is found best?

Newbury. Not any.

Vassalborough. None, except where flax is sown.

XXI. What are the kinds of Grass cut on the Upland for Hay? What proportion is from Seed sown by hand, and what are the kinds thus sown, and in what quantities *respectively* per Acre?

Newbury. Principally herds-grass and clover;—ten quarts of herds-grass seed, and six pounds of clover seed;—the proportion from seed sown by hand is about two thirds.

Vassalborough. Clover, herds-grass, and red-top; all from seed sown by hand, and ten quarts usually sown to the acre; but by some, a much greater quantity is thought preferable.

XXII. Are any Grass lands *new* seeded after scarifying them with the Harrow only, or in any other mode, without ploughing? And what is the success of such practice?

Newbury. Not ascertained.

Vassalborough. None.

XXIII. What weeds, vermin or insects infest the mowing lands?

Newbury. The white weed, radish, and dog grass, or fiorin; the two former are the most common. The insects are the grasshopper. The field mice are a growing evil; they bark the young apple trees in the winter.

Vassalborough. White weed is prevalent; yellow weed and thistles are increasing to an alarming degree; and grasshoppers are sometimes troublesome.

XXIV. Are the spontaneous or cultivated Grasses infested most?

Newbury. Not ascertained.

Vassalborough. No spontaneous upland grasses, and the meadow grasses not infested.

XXV. What methods are used to destroy weeds, vermin or insects, without ploughing the land, and what is their success?

Newbury. The most common way to destroy weeds is by careful tilling three or four years successively. We are sorry to say there are little or no pains taken to destroy the vermin or insects.

Vassalborough. No means are used.

XXVI. What kinds of Beasts, and in what numbers are they, respectively, kept on medium Farms? And how are they subsisted?

Newbury. From one to two pair of oxen, five cows, two or three young creatures, one horse, six sheep. Of late, sheep are increasing.

Vassalborough. On a medium farm are kept one horse, one pair of oxen, four cows, four young cattle, and twenty sheep. The cattle and horse are pastured from the 15th May to the 15th November; but the sheep support themselves about six or eight weeks longer.

XXVII. In what place and in what manner are the Cattle fed with the coarse winter Fodder? Is it given in the stable, in the yard or the field? Is it chopped or given whole?

Newbury. In the barns in the night, and in the day, in the racks or in the yard: sheep do best in the open air except in stormy weather.

Vassalborough. It is usually given whole and in the barn yard; sometimes however in the stable.

XXVIII. How much Butter is usually made in a year from a Cow, all the cream being churned? And how much skim-milk Cheese is made from this same Cow?

Newbury. For six months, five pounds of butter and five pounds of cheese, from the skimmed milk, per week.

Vassalborough. About one hundred pounds may be made from one Cow: The milk is not often made into cheese after skimming.

XXIX. What Food is given to Sheep besides Grass and Hay?

Newbury. In the spring, Indian corn, potatoes, turnips, carrots, &c.

Vassalborough. Oats, peas, beans, meal, corn, potatoes, turnips, &c.

XXX. What is the value of the Subsistence of a Sheep through the year, besides the Pasturage?

Newbury. One dollar and seventy-five cents.

Vassalborough. One dollar and twenty-five cents.

XXXI. What is the value of Pasturage for a Sheep compared with the Pasturage of a Cow?

Newbury. Eight sheep without lambs, and five with lambs.

Vassalborough. One eighth.

XXXII. What is the ordinary Weight and Value of the Flesh of a Sheep when fit for the Butcher? And what is the Quantity of Wool in a fleece?

Newbury. From thirty to forty pounds of flesh; three pounds of wool.

Vassalborough. Weight of sheep from forty to forty-five pounds; value, three dollars; average fleece two and an half pounds.

XXXIII. What Breed of Swine are propagated? How are they fed, how fatted? At what age are they killed; and what do they then weigh?

Newbury. A small boned kind, kept short in the yard the whole year, fed in the summer upon the wash of the kitchen and dairy, with some meat or potatoes, and generally kept thriv-

ing through the summer; in the fall their keeping is raised by adding more meal; are killed in November or December, at the age of about eighteen months; their weight from two hundred and fifty to four hundrod and ten pounds.

Vassalborough. Little attention is bestowed on the breed of swine. They are the common swine of the country, to which, as far as we know, there is no appropriate name. They are kept on grass, potatoes, pumpkins, &c. till one and a half years old; then fattened on boiled or steamed potatoes and meal. Weight about two hundred and fifty pounds.

XXXIV. What number of Bee-hives are kept, what is their product in Honey and wax—what is the management—and what are the obstacles which discourage their extensive propagation?

Newbury. Bees have very much degenerated within a few years, but few are kept; we know not the cause.

Vassalborough. Bees receive but little attention; there is not perhaps more than one hive to two families. They however do well; and a hive affords about thirty pounds of Honey and two of wax.

XXXV. What is the usual quantity of land sowed with Flax-seed? How is it manured and cultivated? And what is the medium produce of Flax and Seed in quantity and value?

Newbury. From an half to one acre, manured with from twenty to thirty loads of manure; the crop from two to four hundred pounds; from six to eight bushels of seed.

Vassalborough. Flax is not much cultivated.

XXXVI. How much Labour is employed on a quarter of an acre of Flax before it comes to the Spinner, and including the preparing the Seed for market?

Newbury. Ten days.

Vassalborough. Eighteen days.

XXXVII. In what articles consists the Surplus of the Farmer which is sold or exchanged for other articles?

Newbury. Hay, barley, potatoes, winter fruit, garden sauce, &c.

Vassalborough. Beef, pork, veal, mutton, poultry, corn, rye, wheat, oats, peas, beans, butter, cheese, potatoes, apples, cider, wiskey, gin, wool, &c.

XXXVIII. How many Loads of manure are collected, (estimating thirty bushels to a load,) from the Cattle in the Barn-Yard, of a medium Farm, in a year—specifying the number and

kinds of Cattle kept on the same Farm, and the manner in which they are kept in relation to confinement or ranging abroad?

Newbury. From horses four loads, if kept in the stable; from horned cattle two load in the winter, and one in the summer, if yarded.

Vassalborough. The stock kept on an average farm, if yarded during summer nights, make about forty loads of manure.

XXXIX. What Quantity of Manure is made in the Hog-pen, specifying the number of Swine fatted, the kind and quantity of Food consumed, and the weight of Flesh produced?

Newbury. From two to four swine, as many load of manure; the keeping, corn and potatoes, &c.

Vassalborough. No one of this Society has been careful enough to mark the quantity.

XL. What methods are used to enlarge the quantity, improve the quality, or prevent waste of the Manure made in the Barn-yard or Hog-pen, and especially to save the Stale of the Cattle?

Newbury. Not ascertained.

Vassalborough. Straw is commonly scattered in the Barn-yard and sometimes in the Hog-pen, to enlarge the quantity, and the general calculation is to have one part of the Barn-yard lower than the other part. No methods are taken to save the stale.

XLI. Is the manure and tillage labour exclusively applied to the best parts of each Farm?

Newbury. Not ascertained.

Vassalborough. They are not.

XLII. In what manner and for what purposes is Manure used, except those indicated in the foregoing inquiries?

Newbury. Not ascertained.

Vassalborough. Manure is sometimes advantageously spread on grass land.

XLIII. What other Manures are used besides those created by the Stock, and what are their merits compared with these?

Newbury. Not ascertained.

Vassalborough. Gypsum and ashes are used.

XLIV. Is Limestone found in your vicinity? Is it used as a manure?

Newbury. Not ascertained.

Vassalborough. Not found.

XLV. Is Buck-wheat cultivated for the Food it yields? Or is it used to cleanse the soil from weeds, to fertilize and enrich it, or for any other purpose?

Newbury. Not cultivated.

Vassalborough. Buck-wheat is not raised for any purpose.

XLVI. In what manner are new Lands brought under Cultivation? Is it customary to plant Orchards in the new settlements?

Newbury. Not ascertained.

Vassalborough. The trees are cut in June; the fire is made to run through in the dry season, commonly September. They are then cut into pieces of about twelve feet in length, hauled togetheri nto piles and burnt. In the course of the fall, grain and grass-seed are sown and the ground harrowed. Orchards are planted.

XLVII. How is Land cleared, which bushes and under-brush have overrun, since the trees were carried off?

Newbury. Not ascertained.

Vassalborough. The bushes are cut in August, which is said to be done with most advantage, when the sun is in the heart. They are burnt in the fall, and grain and grass-seed are sown. Treated in this manner, they are seldom troublesome afterwards.

XLVIII. What is done with Swamps, or Swampy lands?

Newbury. Not ascertained.

Vassalborough. They have been generally neglected; but enough has been drained to shew, that with proper attention they will yield large crops of grass.

XLIX. Is the growth of Wood for timber and fuel equivalent to the consumption in your vicinity? If not, what measures are taken to provide against the inconvenience of future scarcity?

Newbury. It is not. But we have a substitute, peat or turf.

Vassalborough. The growth of wood is more than sufficient for home consumption; but is not equal to the whole consumption, including exportation and the waste occasioned by clearing. No means are taken to guard against future want.

L. Are Wood-lots generally fenced, or left open for cattle to range in without restraint? In getting your wood for fuel, do you pick the oldest trees, or do you cut clear? Which method is best calculated to increase the value of your Wood lands?

Newbury. Generally fenced; we cut the oldest or most decayed trees; the former.

Vassalborough. Wood lots are not fenced. There have been no experiments to ascertain the comparative merit of the modes of cutting; the prevailing opinion is in favour of cutting clear.

LI. What are the causes that the culture of Wheat can no longer be pursued on the sea coast of New-England?

Newbury. It is supposed owing to the easterly winds; we have however for the two or three last years, succeeded in raising wheat.

Vassalborough. Remote from the sea coast.

LII. How far has Gypsum, (Plaister of Paris,) been fairly tried as a manure in the maritime parts of this state? What have been the effects of the experiment?

Newbury. Not ascertained.

Vassalborough. Not known.

LIII. Is the European practice of a succession of Crops found to be expedient in this country, and in what order ought such a succession to take place?

Newbury. Not ascertained.

Vassalborough. The expediency of a succession of Crops has not been ascertained by experiment.

LIV. Is it perfectly ascertained, that with proper attention to manuring the land, it is more advantageous to change the crops than to keep it in Grass?

Newbury. Not known.

Vassalborough. It is not.

LV. Is there any crop so profitable as Grass, taking into view the state of markets in our country, and the distance at which most of our farmers are from a market?

Newbury. We presume none.

Vassalborough. Potatoes, rye and oats, are considered more profitable in this vicinity than grass.

LVI. Can the Farmers raise any crop which, on the whole, affords them so great a profit as Grass, unless they are within twenty miles of the capital?

Newbury. Not known.

Vassalborough. Not ascertained.

LVII. What are the most profitable crops which the state of Massachusetts, taking one year with another, furnishes?

Newbury. Not known.

Vassalborough. Not ascertained.

LVIII. What has been found to be the difference of profit between the Merino Sheep and the Sheep which formed our former stock?

Newbury. The merinoes are as productive as to wool and lambs, and can be kept as cheap, and are no more liable to death or disease than the old stock.

Vassalborough. Merino sheep have lately excited much attention in this and the neighbouring towns; but they have not been in this part of the country sufficient length of time to enable us to make a comparison between them and common sheep, in point of profit.

LIX. Is there any cheap Fodder which can be raised for Sheep, during the winter, which will supercede or will diminish the consumption of Hay?

Newbury. Not ascertained.

Vassalborough. Swedish turnips, carrots and potatoes.

LX. What is the comparative profit of a farm, adapted to the raising of Sheep, between the cultivation of Merinoes, and the raising of any other cattle?

Newbury. At this time none so profitable as merinoes; but at present, the prices of merinoes are so fluctuating, that no accurate calculation can be made.

Vassalborough. Not ascertained.

LXI. Is there any profit derived from the raising of Indian Corn, except for the subsistence of man, which can equal the employment of the same land in raising Grass for the support of Sheep and Cattle during the winter? What are the calculations on which such profits are founded?

Newbury. We say there is no profit in raising Indian Corn, except for the subsistence of man.

Vassalborough. There is none.

LXII. What are the improvements in Dairies which have been made within the last twenty years? Is the quality of the Butter and Cheese improved, and in what consists this improvement, and what are its causes.

Newbury. Not ascertained.

Vassalborough. Not known.

LXIII. Are there any improvements in the Tools of husbandry, which experience has confirmed, and what are these improvements?

Newbury. Not ascertained.

Vassalborough. Not known.

LXIV. Are there any new and valuable Fruits or productions, either contributing to the pleasure or profit of the citizens at large? What are they, what the mode of culture, and what their qualities?

Newbury. Not ascertained.

Vassalborough. Not known.

LXV. Are there any improvements in the breed of Cattle? What are they, what their qualities, and where can they be obtained?

Newbury. Not ascertained.

Vassalborough. Not known.

LXVI Are there any other improvements, (not comprised under the article of manufactures,) which have been made in any branch of Agriculture?

Newbury. Not ascertained.

Vassalborough. None in this vicinity.

EXPERIMENTS ON RAISING WHEAT, BARLEY, &c. WITH REMARKS.

COMMUNICATED BY GORHAM PARSONS, ESQ.

Brighton, November 28, 1814.

DEAR SIR,

I HAVE delayed, until this time, the communication promised you respecting wheat, in the hope of ascertaining the quantity of grain produced from an acre of ground, which, although much blighted and very inferior, would have enabled me to furnish the result of every attempt to raise spring wheat in this town the past season; not having succeeded in obtaining the desired information, beg leave to state the following facts from two of my neighbours, viz.—Mr. Edward Sparhawk sowed in April one bushel of wheat, on what he estimated three quarters of an acre, the soil light and very inferior to the other parts of his farm under cultivation; it was well manured and produced twelve bushels of clean wheat, weighing sixty-two pounds the bushel, full equal in appearance and heavier than the seed

he sowed. Mr. Asa Williams sowed half a bushel on one half acre of ground; the soil light and not equal in quality to the average of his farm; it was planted with potatoes the last year, and he used no manure preparatory to sowing his wheat; it produced six bushels and an half, and weighed fifty-nine pounds the bushel. Mr. Sparhawk and Mr. Williams obtained their seed from Capt. Hardy of this town, on whose land it grew last year.

I sowed four acres and thirty-two rods with four bushels, the land carefully measured by General Badlam, who is considered a correct surveyor; the soil equal in goodness to any part of my farm; ploughed in eight loads of manure to the acre, and laid it down with herd's-grass, red-top, and red-clover; it produced eighty-four bushels and an half of wheat, which weighed but fifty-eight pounds the bushel. In the same enclosure I sowed one acre one quarter and nine rods with one bushel the newly introduced barley from Mr. Preble, and laid it down fo grass in the same manner as the wheat ground, the soil of the same quality; it produced me twenty-seven bushels of barley, which weighed sixty pounds the bushel; in the month of September, I cut from the wheat and barley ground seven large waggon loads of clover; and allowing for some weeds and the stubble, think it may be fairly estimated at six tons when put into the barn well dried, the quality equal to the best rowing or second crop hay. The season was not favourable for grain; the rye in this town, and, I believe, in the neighbouring towns was much blighted; two pieces, one of winter and one spring, that promised much early in the summer, was so ordinary as hardly to compensate one for thrashing; and it was so on a farm adjoining me, which, for several years previous to this, has produced rye of an excellent quality, and the average quantity to the acre. I am satisfied my crop would have been better had double the quantity of seed been sown; say two bushels to the acre, particularly the barley which came up well, but did not spread as I expected. You will receive with this, samples of Mr. Sparhawk and Mr. Williams' wheat; comparing the two parcels, there does not appear that difference that the weight indicates. You have also a sample of my wheat in the ear, gathered previous to reaping, and before a long spell of rainy and cool weather, which I have thought injured it very much. You will perceive a striking difference in the ears, and I think

there must be two kinds of wheat, the red and the white; if there is in fact a difference, it must be owing to my procuring two bushels of my seed from Newton, in the county of Essex, which was mixed with that obtained from Capt. Hardy, who fell short that quantity in the different parcels I had engaged for myself and friends. When the unfavourable season of wheat and rye is taken into consideration, very little doubt, if any, remains on my mind, that we may in any part of our country, (I mean New-England,) raise this kind of grain with success.

Your obedient servant,

GORHAM PARSONS.

To the Corresponding Secretary.

FROM THE SAME, ON THE COMPARATIVE ADVANTAGE OF RAISING CARROTS ON RIDGES AND IN BEDS.

I TRIED the experiment of raising carrots on ridges and in beds, and the result has been, that from beds four feet wide, in which I had four rows, I took six bushels and one peck; and three ridges, (but three rows,) which took the same quantity of ground gave six bushels, the carrots very much superior, and weighed, (those raised on ridges,) fifty-three pounds more than those from the bed. But the difference in labour was astonishing; as carefully as I could make the estimate, that on the bed was forty-two per cent more than on the ridges; it was a piece of ground I took on shares, and was very weedy; in addition it was black heavy loam unsuitable for carrots, and the ridging such ground was perhaps more advantageous than if it had been a light yellow loam suitable for tap roots. But in my ground I am satisfied the labour is much less on ridges than on beds, and the former leaves the ground in much better condition after the crop is taken off.

Note.—I am trying to ascertain the quantity of hay a full grown sheep will eat in a week; and how much more is required for a sheep with a sucking lamb; and have kept an account of the vegetables and grain given to the two lots of sheep, which are separate for the purpose; should I find any material difference from the quantity stated in the books, will communicate it.

ON THE PREPARATION OF FOREST TREES FOR IMMEDIATE USE, AND INCREASING THE DURATION OF TIMBER.

COMMUNICATED BY CAPTAIN LAYMAN, OF THE NAVY.

[From Nicholson's Journal, May, 1813.]

[Whatever may, eventually, be the fate of the invention, which is the subject of the following article, we cannot hesitate to give circulation to a statement of facts, which however extraordinary they may be thought, appear to have been witnessed by a respectable Board of Agriculture in England. The discovery of some better method of seasoning, and fitting timber for durable use than any now practised, is an object of so much importance, that we shall gladly record in our Journal any experiments tending to promote such a discovery. The process employed by Captain Layman is not made known in the following communication; it may have been disclosed in some of the later English publications which we have not seen.

THE juices of a tree being, like the blood of an animal, essential to vitality, but tending to corruption immediately after dissolution, accounts for the well known fact, that the duration of timber is in proportion to the quantity and nature of the juices contained therein at the time of felling and when brought to use. It is therefore obvious, that by withdrawing such juices or blood from a tree while standing, the oak (as expressed by the celebrated Roman architect Vitruvius and by Pliny,) "will acquire a sort of eternity in its duration." But as neither the mode mentioned by those celebrated ancients of cutting a kerf round the bottom of a tree while standing, as performed at Bengal, or the one suggested by Dr. Plott, of decorticating the tree, leaving it standing, as practised by the natives of Malabar for ages, will effect this desideratum, I made the following analysis:

On the 1st of June, 1812, I made experiments upon growing young oaks, one of which, that had been operated upon,* was

* This oak, from the wetness of the season, contained six tenths of its weight in fluid; but in general I have found six elevenths in June and four elevenths in January, to be the quantity of fluid contained in growing oaks.

converted the next day, increased in strength in the proportion of four hundred and thirty-six to six hundred and nine, and when doubly prepared, to eight hundred and forty-six. And, as a test of comparative duration, I made extracts from the heart, and sap of the same tree in its natural state, and when prepared, the following is the result.

1. The sap or embryo wood, in its natural state, speedily concreted, and mucor or mould was formed in fourteen days.

2. The heart, in its natural state, contained much less putrescent matter than the embryo or sap, but a larger portion of gallic acid and acrimonious liquid. This extract had a smell like fetid ditch water, and mucor was formed in forty-nine days.

3. The heart of the prepared oak is perfectly sweet to the smell, and had no other appearance but a pellicle from the glutinous matter contained in the wood.

4. The embryo wood of the prepared part has the same appearance as the heart, being equally free from any symptoms of putrefaction.

On the next day I proceeded to verify the facts before a well attended Board of Agriculture, consisting of several members of both houses of parliament, who expressed a lively interest on the occasion: the following is the substance of a minute made by the President at the time.

Board of Agriculture, June 2d, 1812.

The Board adjourned to examine some experiments made by Captain Layman, on the preparation of forest trees for immediate use on being felled, by which the specific gravity is diminished and the sap (or embryo) wood rendered useful, as well as the strength and duration of the timber considerably increased. The following is the result, from pieces one foot in length and one inch square.

1. Poplar (Lombardy) cut from a tree in a growing state, broke with three hundred and thirty-six pounds.

2. Poplar (Lombardy) counterpart piece of ditto, *prepared,* in three hours, bore three hundred and sixty-eight pounds.*

* This experiment was made to show in how short a time wood could be prepared for use from a growing tree; but a young standing Weymouth pine which was experimented upon with a view to masting timber, and which was three days in preparing, had not only its weight re-

3. Seasoned English oak broke with seven hundred and eighty four pounds.

4. Seasoned English oak, *prepared*, bore nine hundred and two pounds.

This piece when broken, proved to be naturally defective internally; but a second piece, prepared by Captain Layman, appeared to have sustained one thousand and seven pounds.

5. Sap or embryo wood of oak *prepared* and *preserved*, bore nine hundred and thirty pounds.

6. Counterpart piece of ditto, in its natural state, broke with five hundred and thirty-six pounds.

7. Common white deal, in its natural state, broke with three hundred and thirty-nine pounds.

8. Counterpart piece *prepared* and *preserved*, bore five hundred and eight pounds.

Note.—Specimens were produced by Captain Layman to the Board, of the matter producing the decomposition of wood.

On the 23d of July following, I made experiments at the Navy Office.

No. 1. Dry rot timber (Canada oak) of the Queen Charlotte, as received from the Navy Board, July 18th, 1812.

2. Ditto cured.*

3. Dry rot and sound timber (English and Canada oak and pitch pine) of ditto in its common state.

4. Counter pieces of ditto, *preserved*. The above were put into bottles and sealed up by the Navy Board.

5. A piece of English oak, broke with two hundred and twenty-eight pounds. This was said, to be a bad specimen, but it was a counterpart of what the Queen Charlotte was framed with.

6. A piece of sound English oak prepared and preserved, bore eight hundred and ten pounds.

7. A piece of Canada oak, of the Queen Charlotte, in its natural state, broke with five hundred and twenty-eight pounds.

8. A piece of ditto, prepared and preserved, bore six hundred and sixty pounds.

duced, but its strength increased from two hundred and forty-three to four hundred and fifty.

*I must here repeat what I observed at the Navy Board at the time, that "prevention is better than cure."

9. A piece of pitch pine in its natural state, broke with six hundred and seventy-two pounds.

10. A piece of ditto, prepared and preserved, bore eight hundred and thirty-four pounds.

Upon this principle increased duration was given to *teak sisso*, and *saul;* which would be a great acquisition to the auxiliary aid required for our navy. But the most important result is, that trees of our own growth that succeed on the poorest soils in Great-Britain, which will not produce corn, are rendered very superior to any foreign oak imported, and preferable to the best English oak in common use for hull timber; and although some species are naturally weaker and heavier than foreign spars, they may be so prepared as to admit of being made into masts, yards, &c. *smaller*, *lighter*, *stronger*, and *infinitely more lasting*, than those made of American or even Russian fir.*

And as the sap or embryo wood, would not only be rendered useful, but the timber fit for immediate use, it would furnish the means to do away the waste of timber and loss of time and money that take place in what is termed *seasoning*, particularly in his majesty's ship yards,† either when a ship is framed, or,

* The roof of Westminster Hall, built in 1399, is formed of sweet chesnut, which probably grew in the neighbourhood, as the site of London was formerly a chesnut grove of spontaneous growth; yet the use of this fast-growing timber, which succeeds in the most barren sands, *is unknown in our dock yards*, as is that of the ash for the purpose of ship building, although its utility is so well known for agricultural and other purposes; and as it contains much less gallic acid than the oak or even the chesnut, it would be less destructive to iron.

† I have tried eighteen different methods of preparing and seasoning timber, and with only one exception found the mode, or rather the custom in use in his majesty's dock-yards to be the worst. In 1805, the late Mr. Alexander Mackonochie proposed a "Scheme for the ready seasoning of timber, in depriving it of its oxygen by means of condensed steam, which would leave a vacuum, and thereby draw out the fluids from the wood, that when so freed, if plunged into oil, their reentrance would forever be effectually precluded, and the strength of the wood found to be much increased, as well as the timber not only immediately seasoned, but preserved in all its pristine state." This appears very specious; but had the ingenious theorist brought it to the test, it would have been found to promote a tendency directly opposite to what was proposed. Some months ago, the principle of impregnating timber was again renewed, as in a work of considerable eminence,

what is yet more erroneous, by placing the timber in piles, as there practised. For as not only the cause of decay, but shrinking and rents would be removed, it is obvious that the timber for building a ship, or for any other purpose, might be readily formed on the spot where produced, exclusive of the saving in carriage or freight of at least one half. The timber although converted in different parts of this country or the world, would be ready to form part of a ship the instant it was delivered into the arsenal of construction; and as the decomposition of timber commences from the moment a tree is cut down, a ship so built in six months, in a dock or slip, *under cover*, would be much more lasting than one six years in building.* And if the plank, after being prepared, was brought to and combined to the timbers *without being transversely perforated*, it is clear, that if the timber were properly moulded, the fabric would be much stronger with at least one fourth less wood; and not only would the building of the ship be much facilitated, but in the event of requiring to shift either timbers or plank, from accident, it might be done as simply as shifting the stave of a cask. And if ships so constructed, when not wanted for actual service, had the masts taken out, and were placed in a covered *dry* dock, and kept well aired by opening a plank or two on each side the bottom, the duration would be infinitely increased.

If the duration of timber were in future doubled, it is evident not only that but half the number of ships would he required, but that half the present annual expense of building and repairing ships only would be required, and a like deduction of expense be made on all other fabrics in which timber is used.

published in September, 1812, it is stated—"Experiments, we understand, are now making at Woolwich, on the speedy seasoning of timber by stowing some hundreds loads in a close kiln, and introducing by means of a retort filled with saw dust an oleaginous substance. The idea is ingenious, but we augur no useful results from the experiments themselves." The unfortunate result a short time after is well known; for although owing to a particular circumstance, an active ingenious person was employed, an explosion took place, by which, exclusive of the damage, several men were killed and wounded.

* The Lively frigate was five years in building. The Queen Charlotte, 100 guns, seven years. The Revenge, 74, nine years. The Caledonia, 120, twelve years. Hibernia, 120, fourteen years. The Ocean, 98, fifteen years.

MISCELLANY.

[Selected.]

THE slightest appearance of a tendency in sheep to produce discoloured wool, should be shunned like a contagious distemper. Such was the attention o the ancient shepherds of Italy to preserve the pure whiteness of their wool, that they did not trust to the colour of the fleece alone, but carefully examined the mouth and tongue of the ram; and if the least blackness or swarthiness appeared, he was immediately rejected from the flock, that he might not communicate the colour to the fleeces of the lambs.

"Illum autem, quamvis aries sit candidus ipse,
Nigra subest udo tantum cui lingua palato,
Rejice, ne maculis infuscet vellera pullis
Nascentum.——GEO. III. line 387, &c.

Letter to Mr. Bakewell, from a friend, June 9, 1808:—"In conversation with Capt. Goodall, whose connection with St. Domingo you may have learned from the newspapers, he mentioned some particulars respecting two ewes, which corroborate the opinion that you are going to publish upon the effect of excessive heat on the fleece. These animals, soon after their arrival on the island, became languid and sickly, lost their wool, and in twelve months a harsh, sparing crop of hair was observed on them."

Lord Somerville's account of the effect of heat on the wool of his merino flocks, even in our temperate climate, is a farther illustration of this truth. The practical inference to be made from both these instances, is obvious. It evinces the advantage which must arise from keeping sheep in cool and shady situations during the heat of summer, particularly after the time of shearing. The natural instincts of the animal, if attended to, would teach us the propriety of providing the flock with a shade and defence against the fervid rays of a meridian sun in the three summer months.

The experiments of M. Ivard, in 1800, made in France on four merino sheep, tend to prove, that where the fleece is suffered to grow more than one year, the quantity of wool produced is less than when the animal was shorn twice in the same time. These experiments agree with the observations of M. Fink, made in Saxony, and accord with what takes place on almost every other breed of sheep on which the same experiments have been made. They are however at variance with the results of M. Gilbert's experiments on a part of the merino flock at Rambouillet. The method adopted by M. Ivard, appears from its accuracy to have the preference.

A Remedy for the Canker and other Wounds in Trees.—The damaged parts of the tree must be cut or peeled off in the spring, and the places must be rubbed in a fine sunny day with turpentine, which becomes a sort of varnish, so that the wounds will be hermetically closed, and the tree will speedily recover. By this simple and cheap remedy many trees have been already saved, which in the spring showed symptoms of decay. Even all the upper part of the bark has been cut away, and in the space of a year an entire cure has been effected.

Mr. Burrows, of Weasingham, England, lately produced twelve tons per acre from sixteen acres of carrots at a cost of £176, or £11 per acre. He then fed twenty-eight cart horses with them for sixteen weeks, at two bushels each per day, mixed with a quarter of a peck of oats; and on a comparison of food in hay and oats, he found that the same horses, in the same time, would have consumed the produce of forty-two acres, being a saving of twenty-six acres in sixteen weeks.

NOTICE TO CORRESPONDENTS.

The late communication of the inventor of a machine for irrigating lands, marked Λ, is received. The Trustees will be happy to learn the result of the experiment he is about making.

PREMIUMS

OFFERED BY THE TRUSTEES OF THE MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE.

1. To the person who shall have raised within two years from the first day of June, 1814, the greatest quantity of woad within this Commonwealth, not less however than three hundred pounds, and shall produce to this Board specimens of the same, provided the quality thereof be good, a premium of *one hundred dollars.*

2. To the person who shall within three years from the first day of June, 1814, produce a specimen of madder of good quality of his own growth, and who shall have actually raised the greatest quantity thereof, in this Commonwealth, being not less than 1000 pounds, a premium of *one hundred dollars.*

3. To the person who shall invent the most approved machine for thrashing or separating grain, (regard being had to it fitness for a medium farm,) a premium of *one hundred dollars;* to be claimed on or before the first day of June, 1816.

4. To the person who shall invent the best and cheapest machine for cutting *straw* and *corn stalks*, (as fodder for cattle,) which shall admit of the application of horse power, a premium of *seventy-five dollars;* to be claimed on or before the first day of June, 1816.

It is required that the communications, for which the foregoing premiums are offered, be accompanied with proper certificates from the selectmen, magistrates, or clergymen of the vicinity, or other vouchers, to the satisfaction of the Trustees; that they be delivered without names, or any intimation to whom they belong; and that they be severally marked in such manner as each claimant shall think fit; the claimant sending also a paper, sealed up, having on the outside a corresponding mark, and on the inside his name and address.

RICHARD SULLIVAN, *Recording Secretary.*

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ERRATA, (No. 1, Vol. III.)

Page 59, line 14, from the top, between the words, *from hundred*, insert the word *one*.

58, — 28, from top, between the words, *again produce*, insert a semicolon, ;

60, — 17, dele the word *this*, and insert *their*.

60, — 23, dele the *s*, at the end of the word *furrows*.

60, — 29, between the words *plough with*, insert the word *in*.

65, — 6, from the bottom, add an *s*, to the end of the word *time*.

66, — 11, from bottom, dele the *s*, at the end of the word *operates*.

In No. 2, Vol. III.

Page 95, line 13, from top, for *sonsidered*, read *considered*.

98, -- 10, from top, for *Mons. Jean*, read *Messire Jean*.

106, -- 4, from bot. between the words *should be*, insert the word *previously*.

107, -- 1, at the top, dele the word *seed*.

107, -- 15, from the top, dele the word *two*, and insert the words *four or five*.

107, -- 21, from the top, after the word *be*, add the word *put*.

110, -- 10, from bot. for *Crotolaria*, read *Crotalaria*.

128, -- 5, from bottom, dele the *s*, at the end of *Agrostiss*.

129, -- 9, from top, for *Migra*, read *Nigra*.

130, bottom line, dele *en* once in *arvensis*.

131, line 2, from top, for *Hordium* read *Hordeum*.

147, -- 10, from top, for *Swannerdam*, read *Swammerdam*.

147, -- 11, from top, for *Scheiac* read *Scheirac*.

161, -- 11, from bottom, for *bed*, read *been*.

167, -- 7, from top, for *top* read *tap*.

173, -- 15, from top, for *Perbendary*, read *Prebendary*.